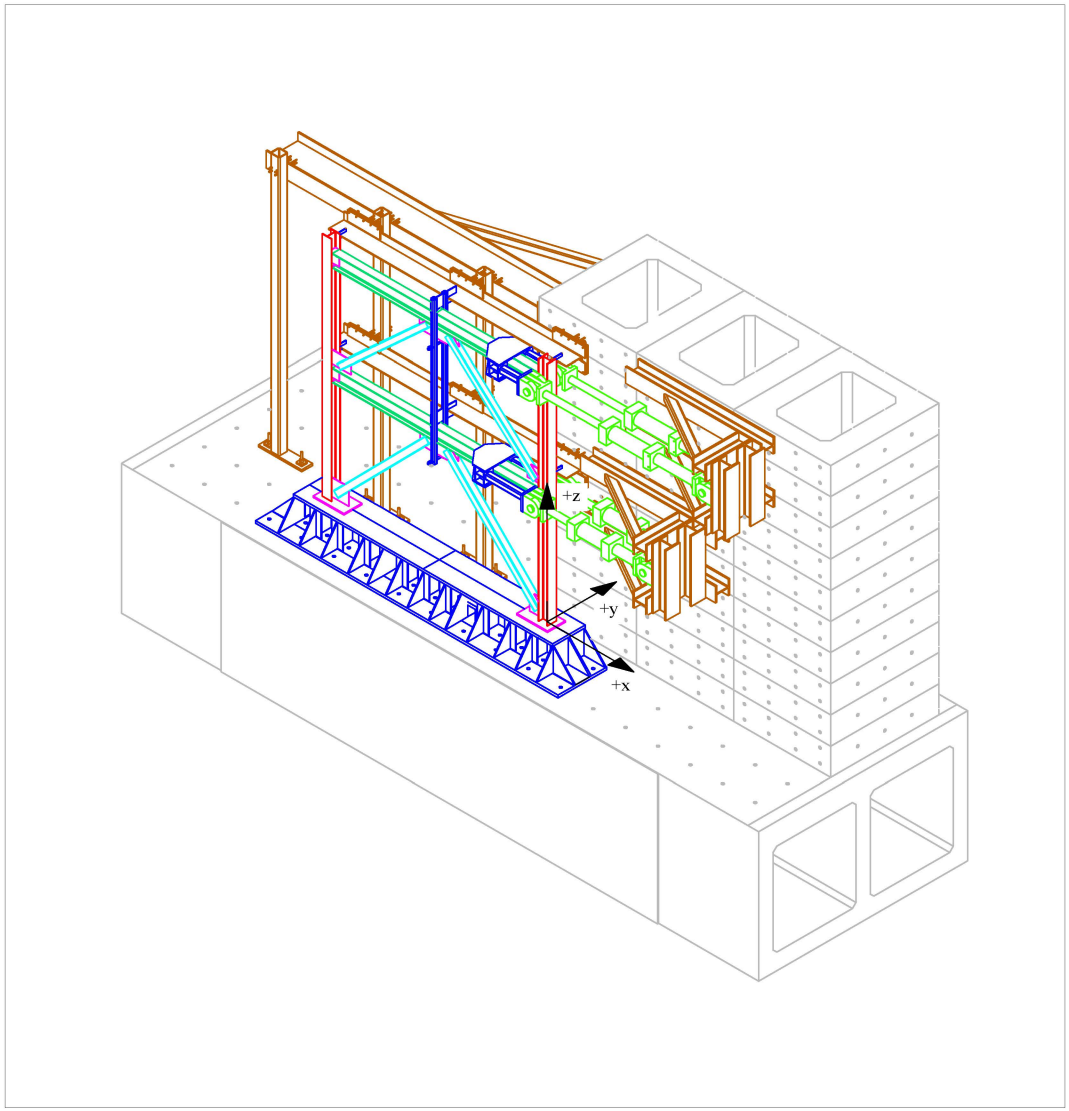


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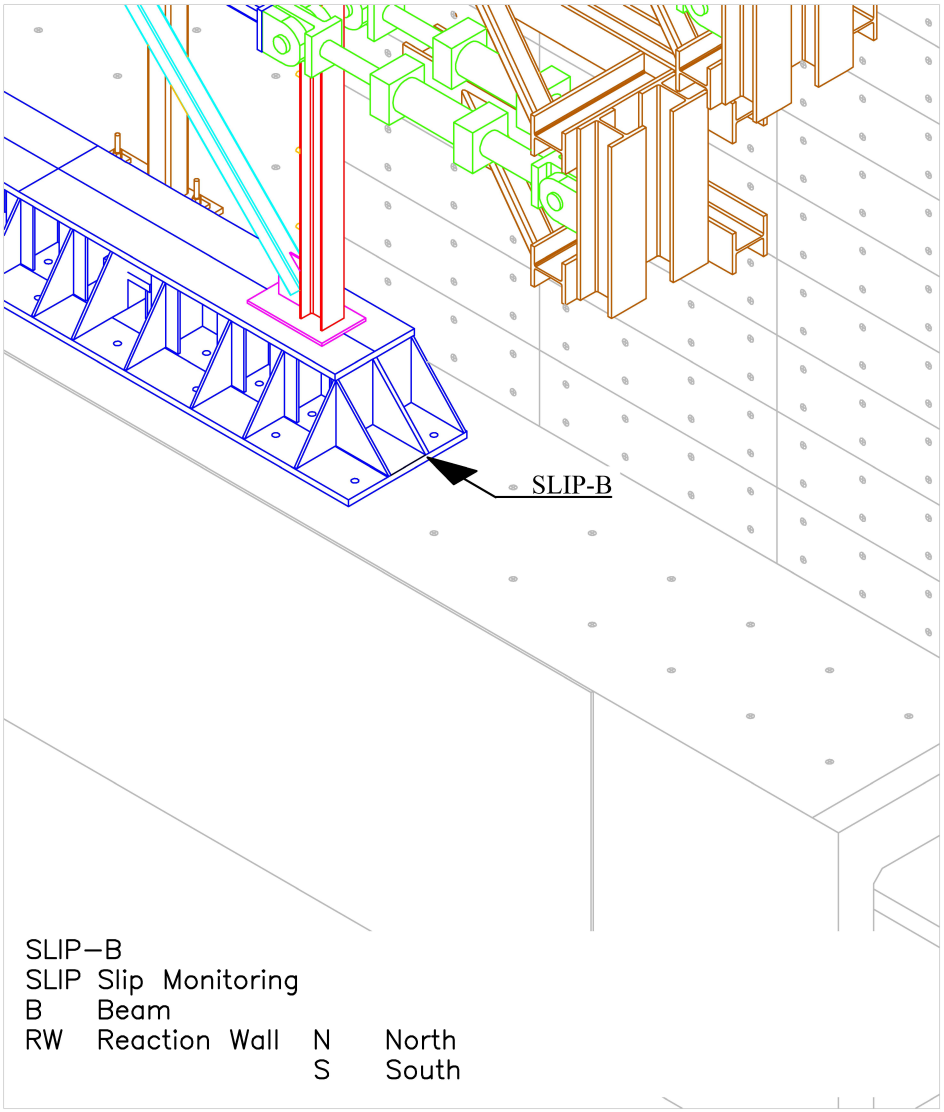
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

Drawn by
Barb Simpson

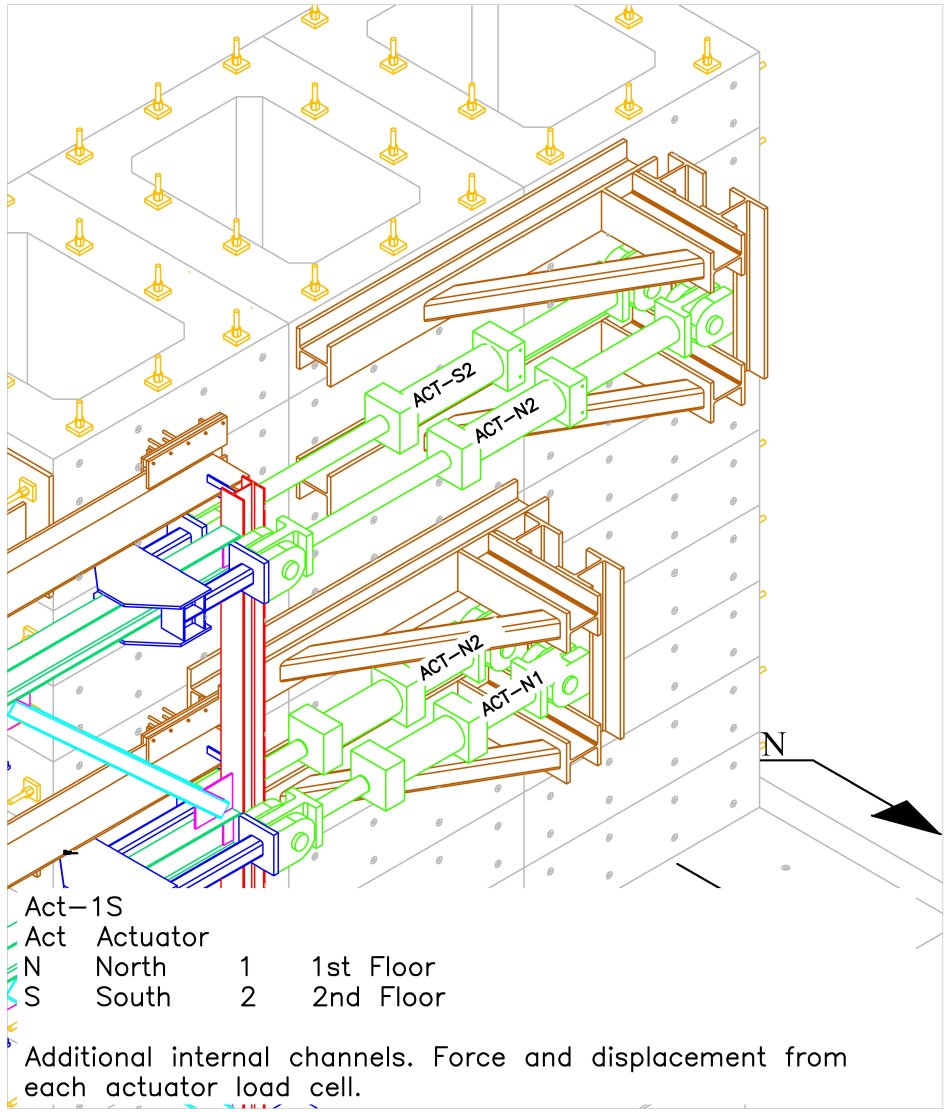
Date
7/18/2014

Sensor Title
NCBF–B–1

Sheet
S0



SLIP–B
SLIP Slip Monitoring
B Beam
RW Reaction Wall N North
S South



Act–1S
Act Actuator
N North 1 1st Floor
S South 2 2nd Floor

Additional internal channels. Force and displacement from each actuator load cell.

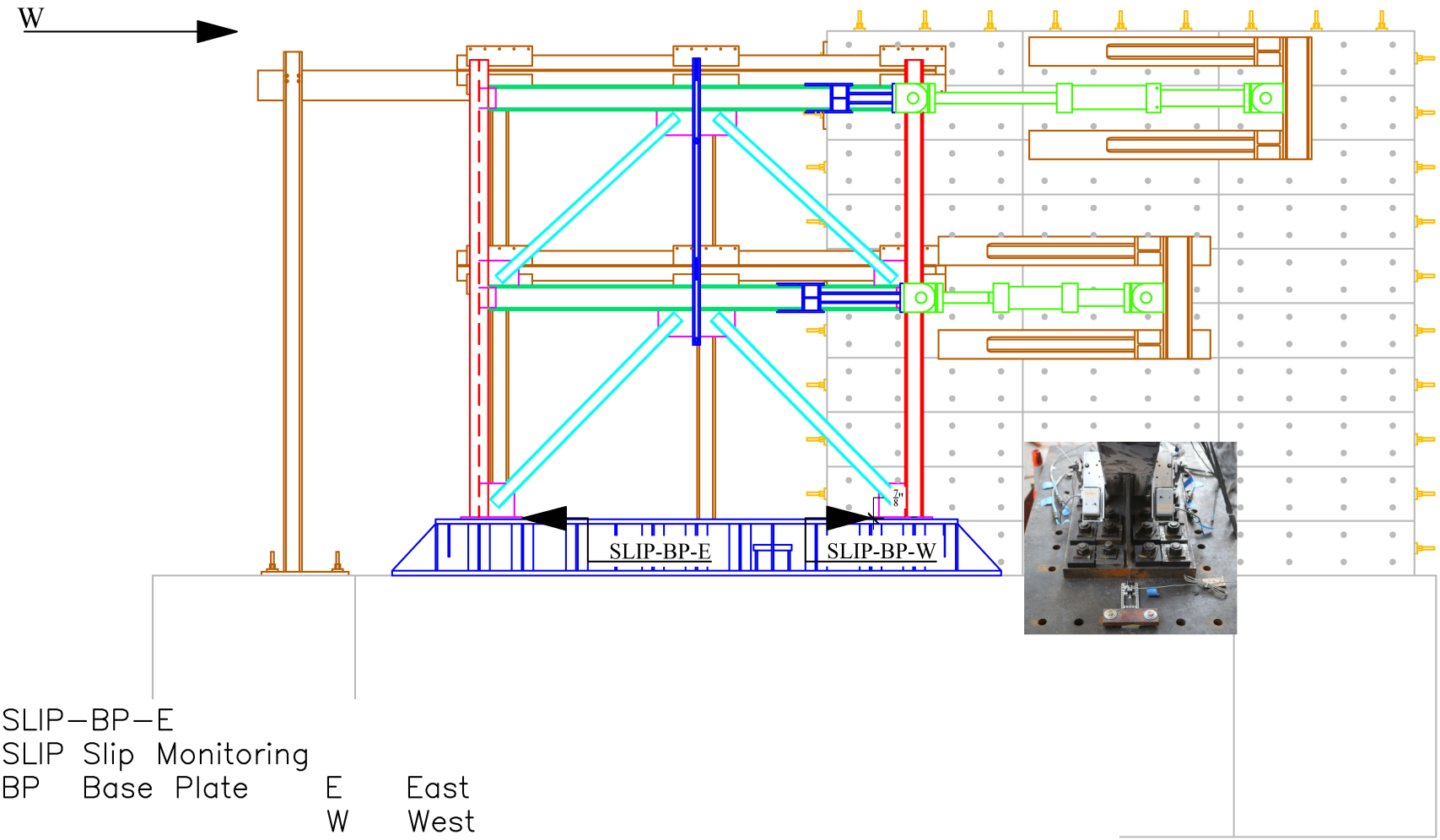
Project
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Date
7/18/2014

Sensor Title
Test Monitoring

Sheet
S1



SLIP–BP–E
SLIP Slip Monitoring
BP Base Plate E East
W West

Align with braced frame centerplane at middle of base plate.

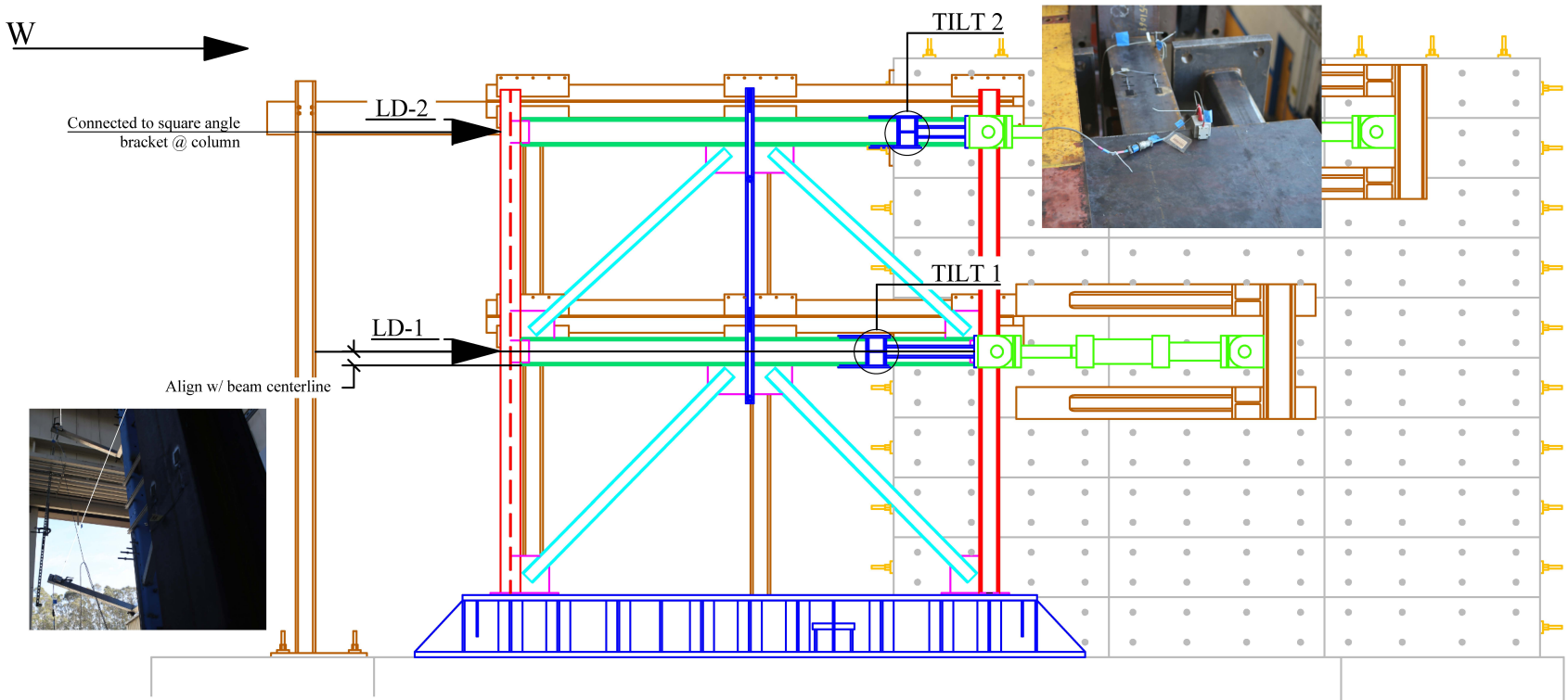
Project
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Date
7/18/2014

Sensor Title
Slip LVDT

Sheet
S2



LD-1
LD Lateral Displacement Monitoring
1 1st Floor
2 2nd Floor

Align with beam centerline at each floor. Connect to supporting frame column by elbowed HSS Aluminum pieces.

TILT1
TILT Accelerometer monitoring angle of actuator brackets.
1 1st Floor
2 2nd Floor

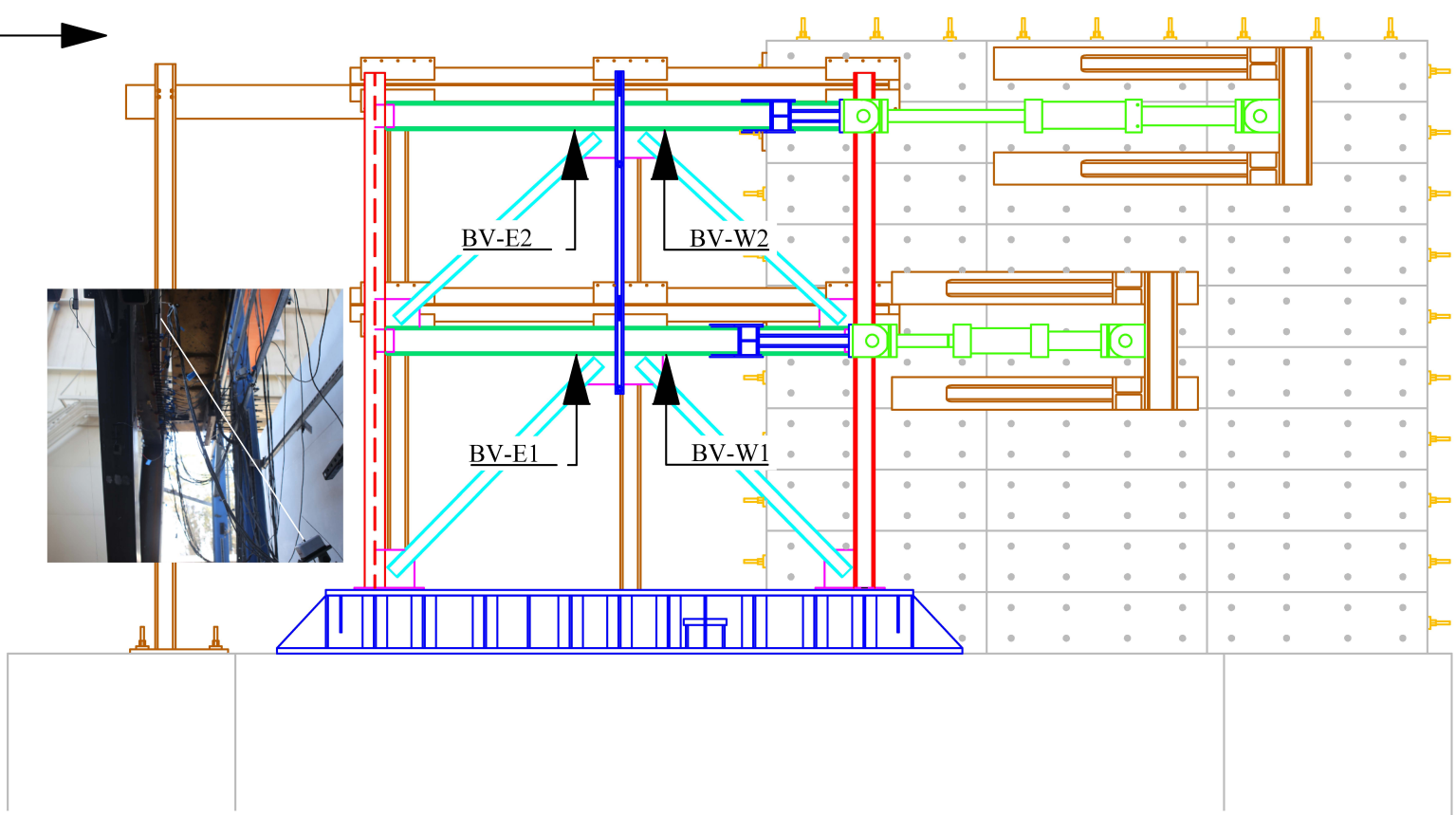
Project
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Date
7/18/2014

Sensor Title
Story Displacement

Sheet
S3



BV-E1
BV Beam Vertical Displacement
E East 1 1st Floor
W West 2 2nd Floor

Align with beam bottom flange and gusset edge.
(2) on either side of beam frame.

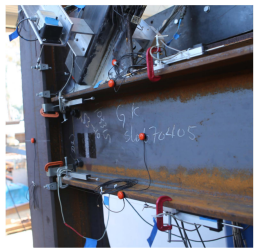
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Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

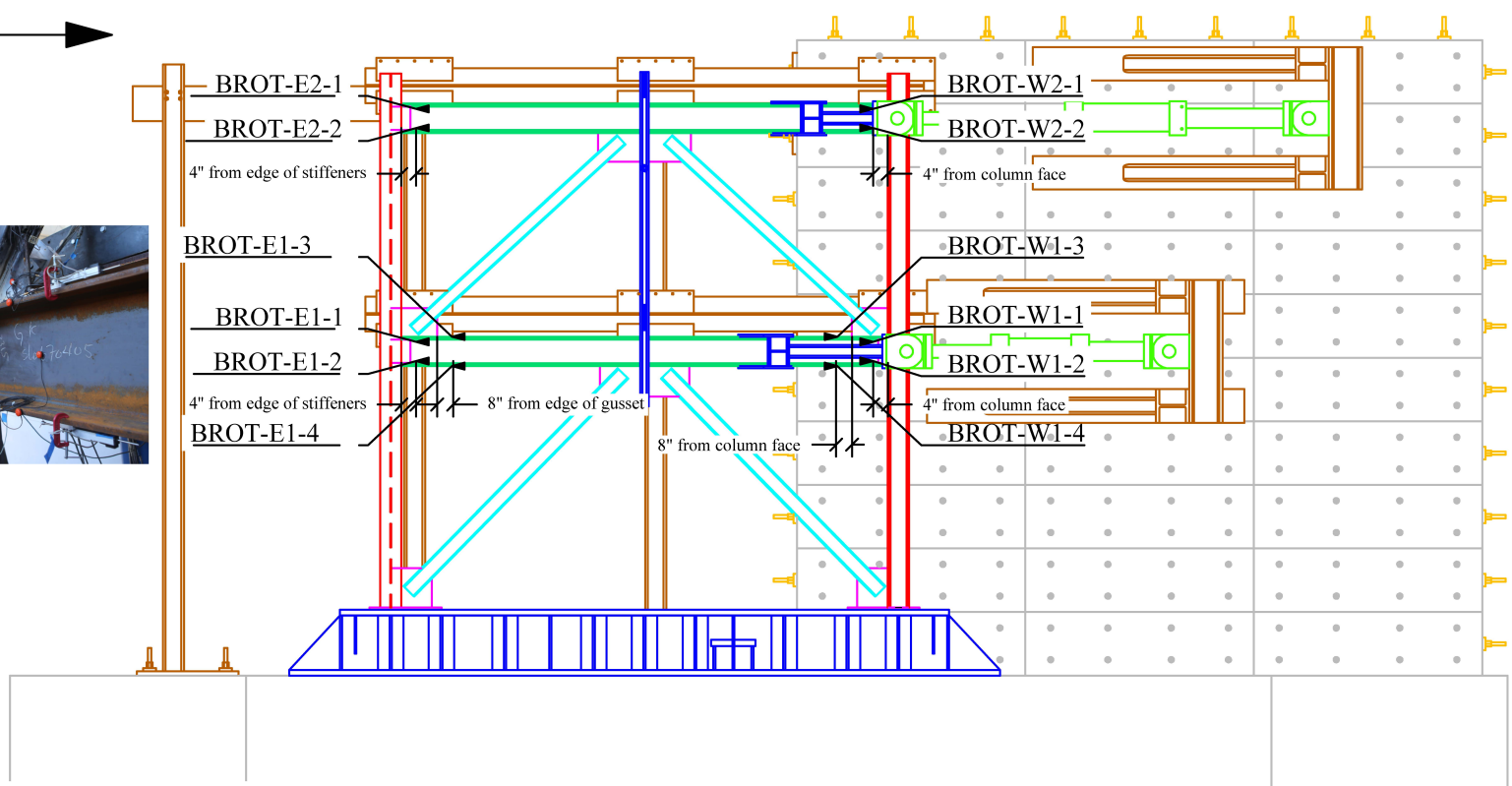
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7/18/2014

Sensor Title
Vertical Beam WirePot

Sheet
S4





BROT-E1-1
BROT Beam Rotation Monitoring
E East 1 1st Floor
W West 2 2nd Floor
1,2 Outer Location, see drawing (1-top, 2-bottom)
3,4 Inner Location, see drawing (3-top, 4-bottom)

Target at column face (at stiffener for weak-axis column and flange for strong-axis column) at each floor.

Project

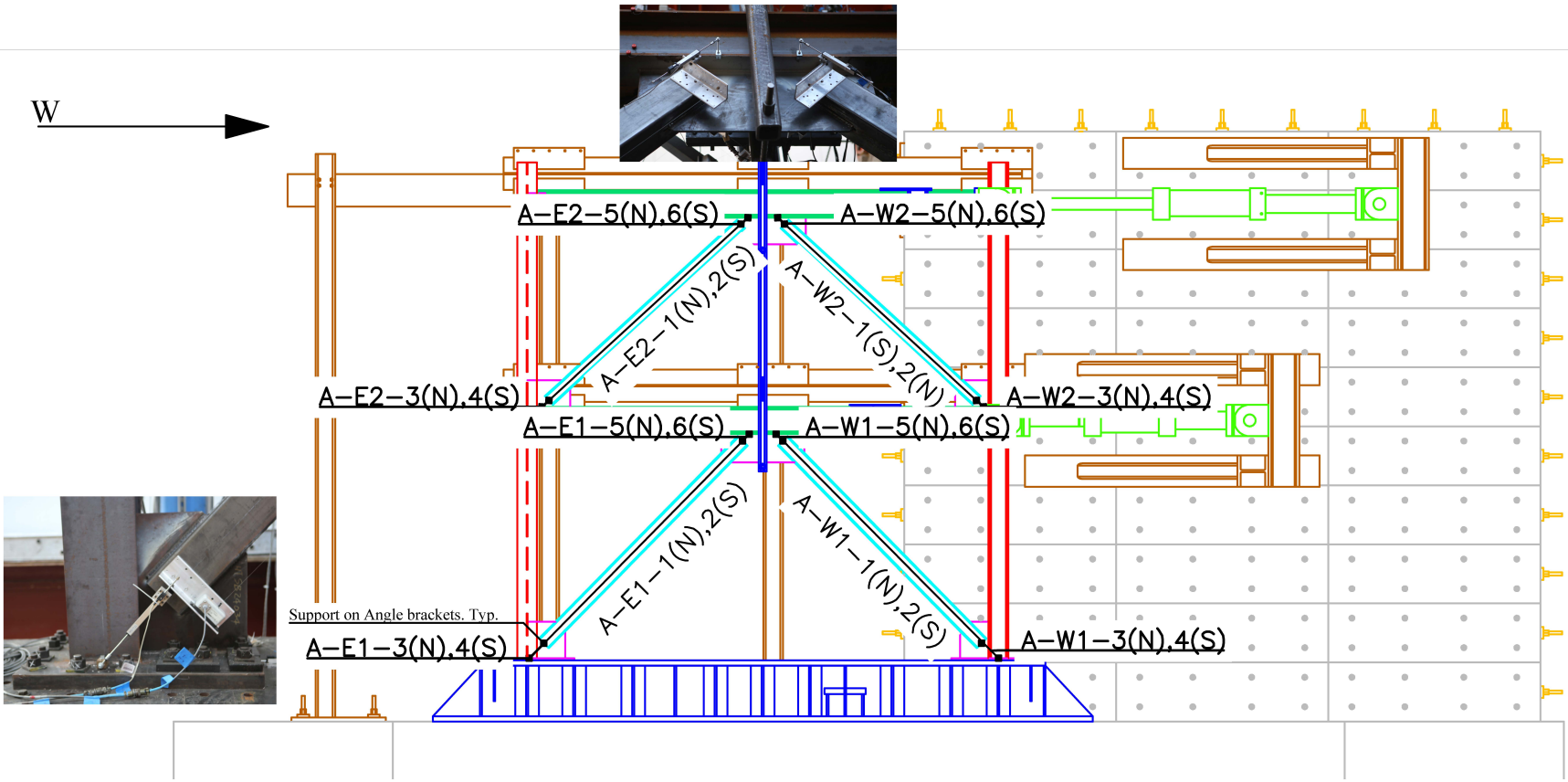
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Date
7/18/2014

Sensor Title
Beam Rotation LVDT

Sheet
S5



A–E1–1
A Axial Deformation of Brace
E East 1 1st Floor
W West 2 2nd Floor
N North Facing Front View
S South Facing Back View
1,2 Wire pot from brace end-to-end
3,4,5,6 LVDT, see drawing for location (3,4-lower, 5,6-upper)

Brace axial deformation monitoring along the axis of brace. Support on brackets 4" or 5" from face of brace on both sides of brace. LVDT at ends of brace to monitor brace out–of–plane rotation. Wire pot to measure brace elongation.

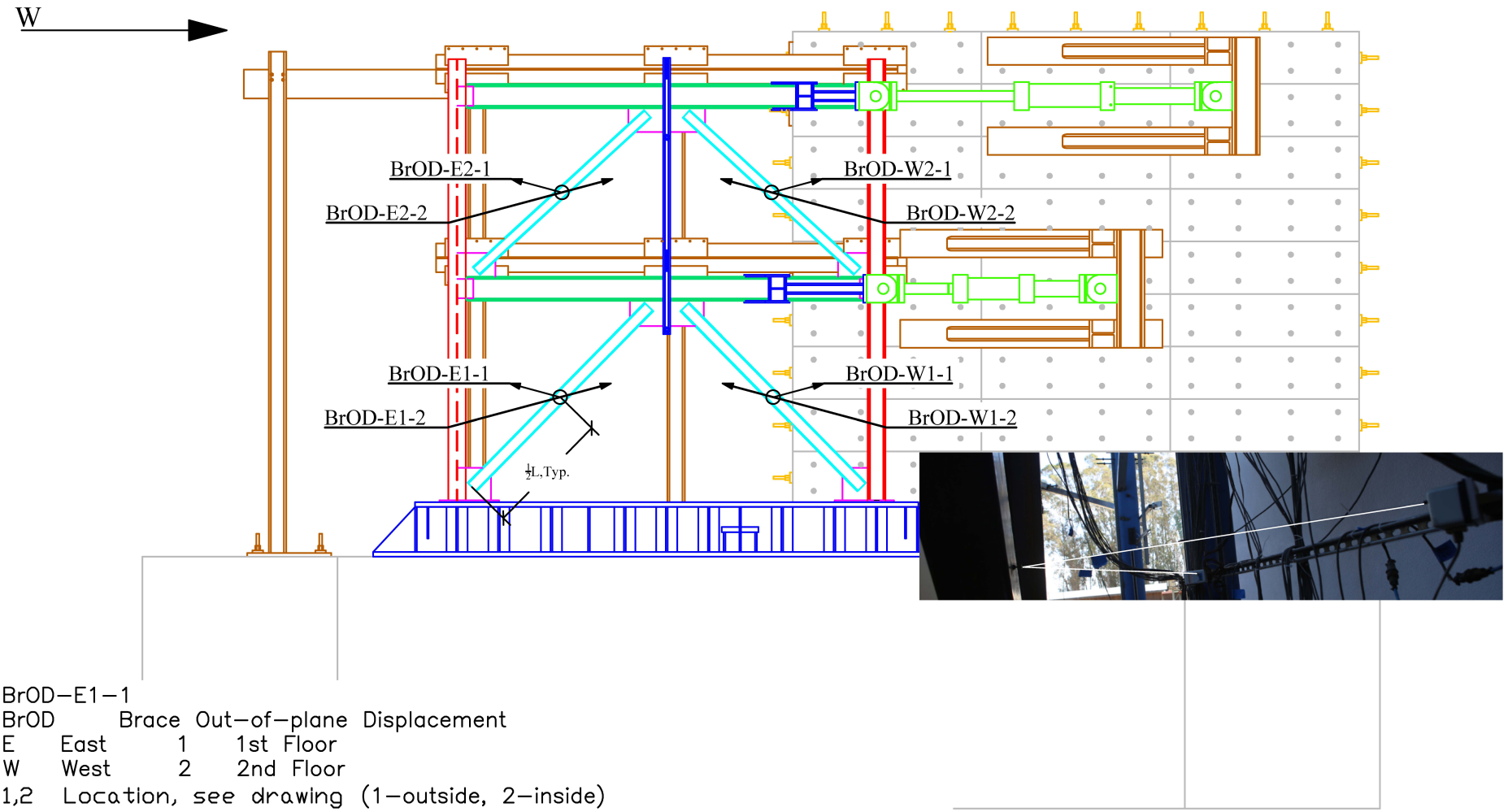
Project
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

Drawn by
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Date
7/18/2014

Sensor Title
Brace Axial

Sheet
S6



BrOD–E1–1
BrOD Brace Out–of–plane Displacement
E East 1 1st Floor
W West 2 2nd Floor
1,2 Location, see drawing (1–outside, 2–inside)

(2) Wire Pots per Brace. Align at Brace Centerline. Connect to supporting frame. Target welded at brace midpoint.

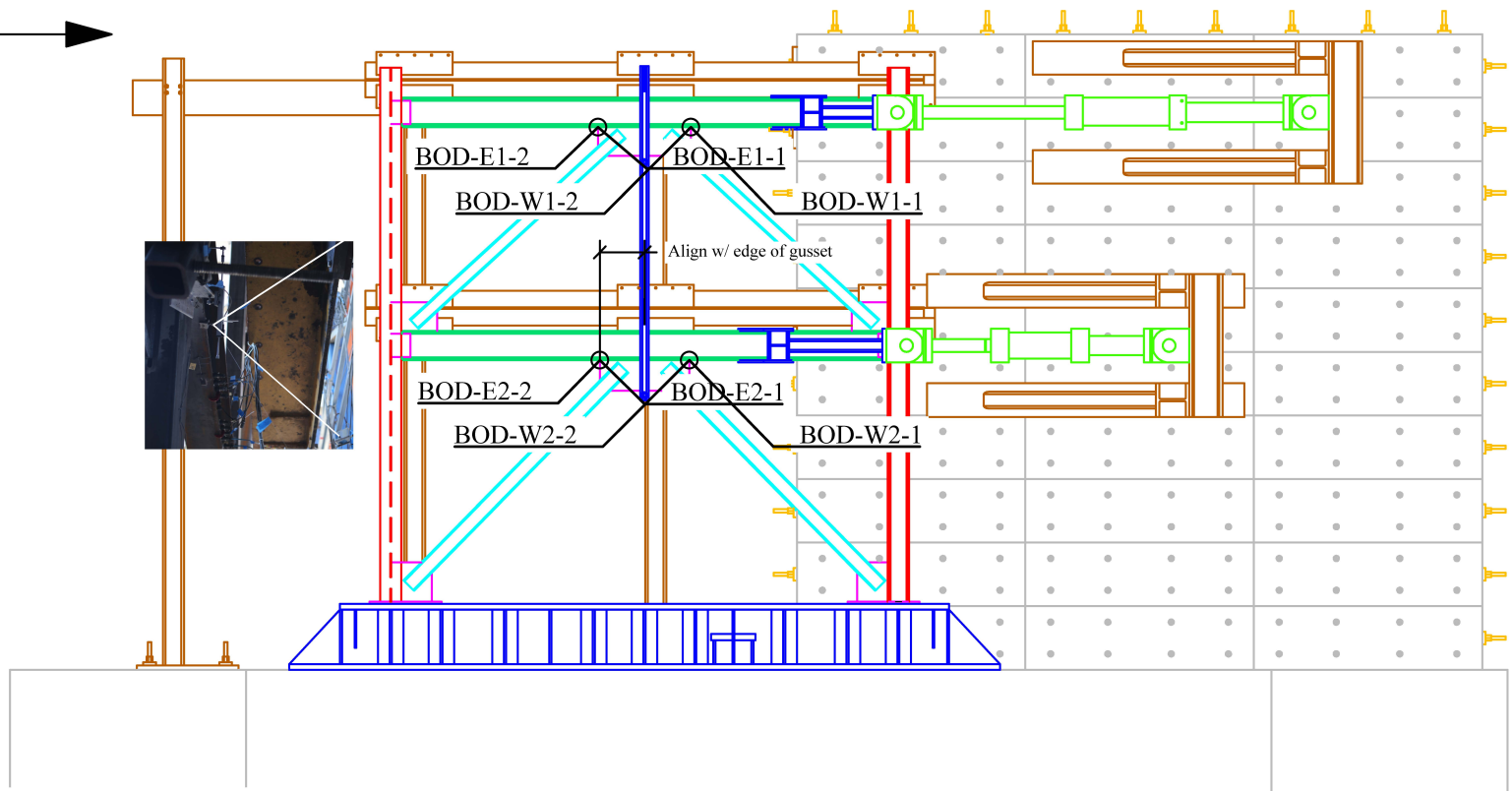
Project
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Date
7/18/2014

Sensor Title
Brace Out–of–Plane

Sheet
S7



BOD–E1–1
BOD Beam Out–of–plane Displacement
E East 1 1st Floor
W West 2 2nd Floor
1,2 Location, see drawing (1–top, 2–bottom)

Align with Edge of Gusset. Target at beam flange.

Project

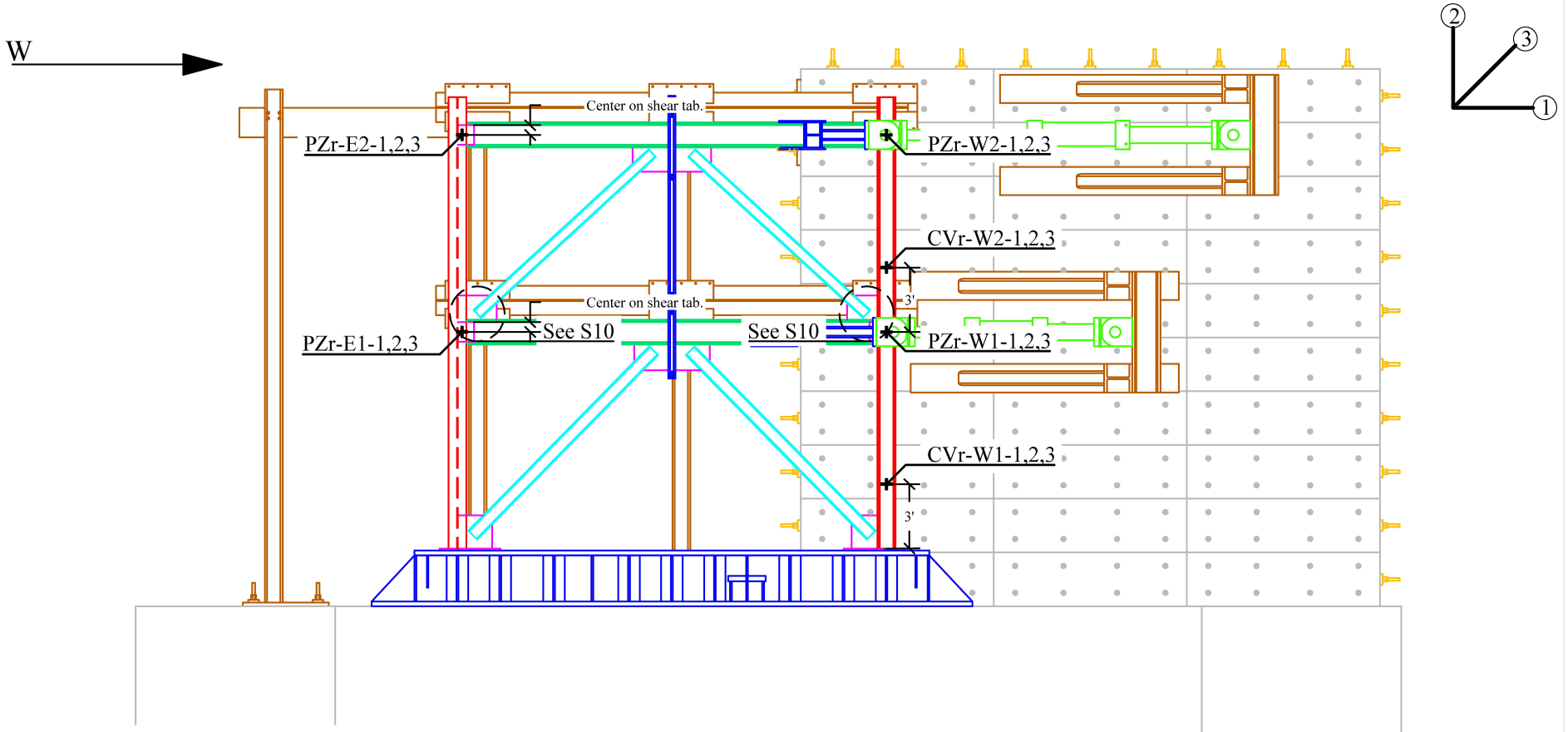
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Date
7/18/2014

Sensor Title
Beam Monitoring

Sheet
S8



PZr-E1-1,2,3
CVr-E1-1,2,3
PZr Panel Zone rosette
CV4 Column Shear rosette
E East 1 1st Floor
W West 2 2nd Floor
1,2,3 1-0deg. 2-90deg. 3-135deg.

Project

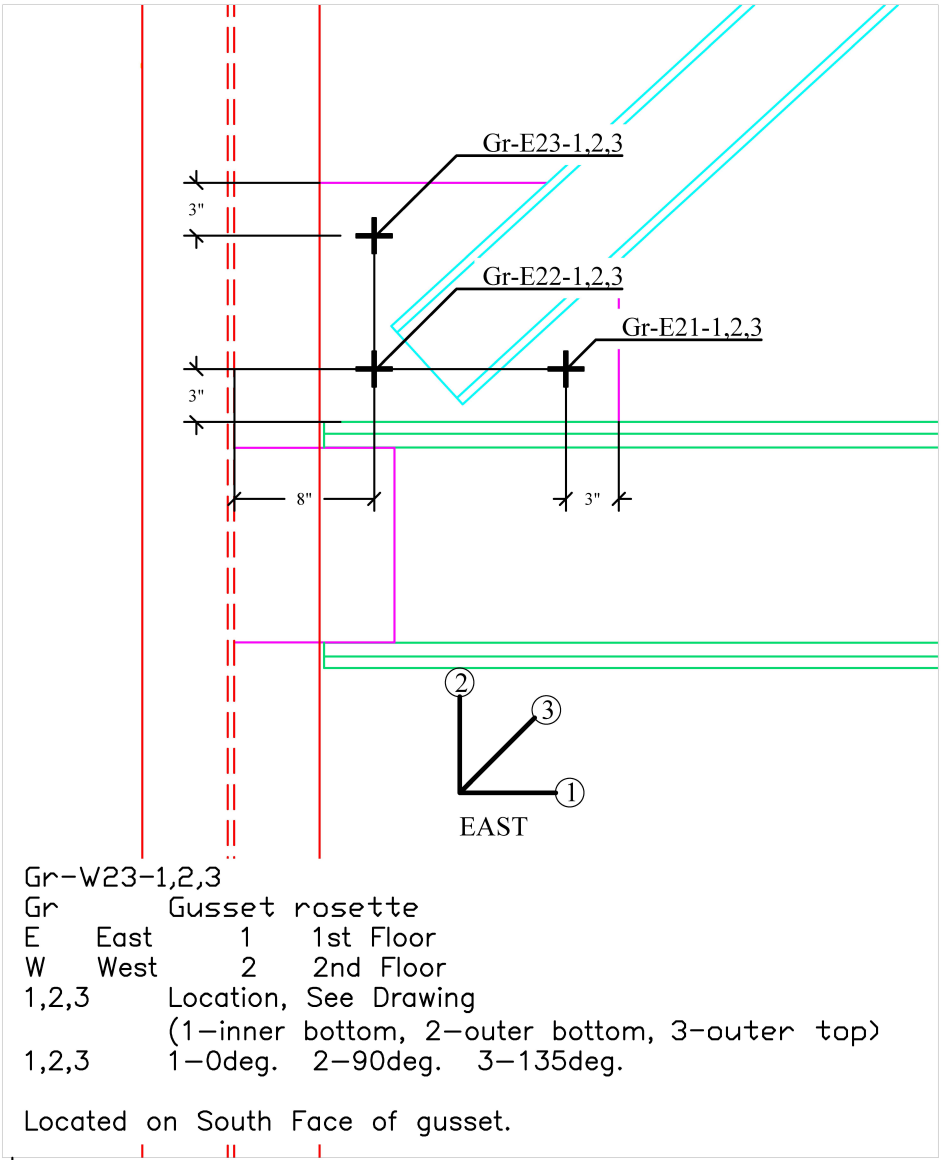
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

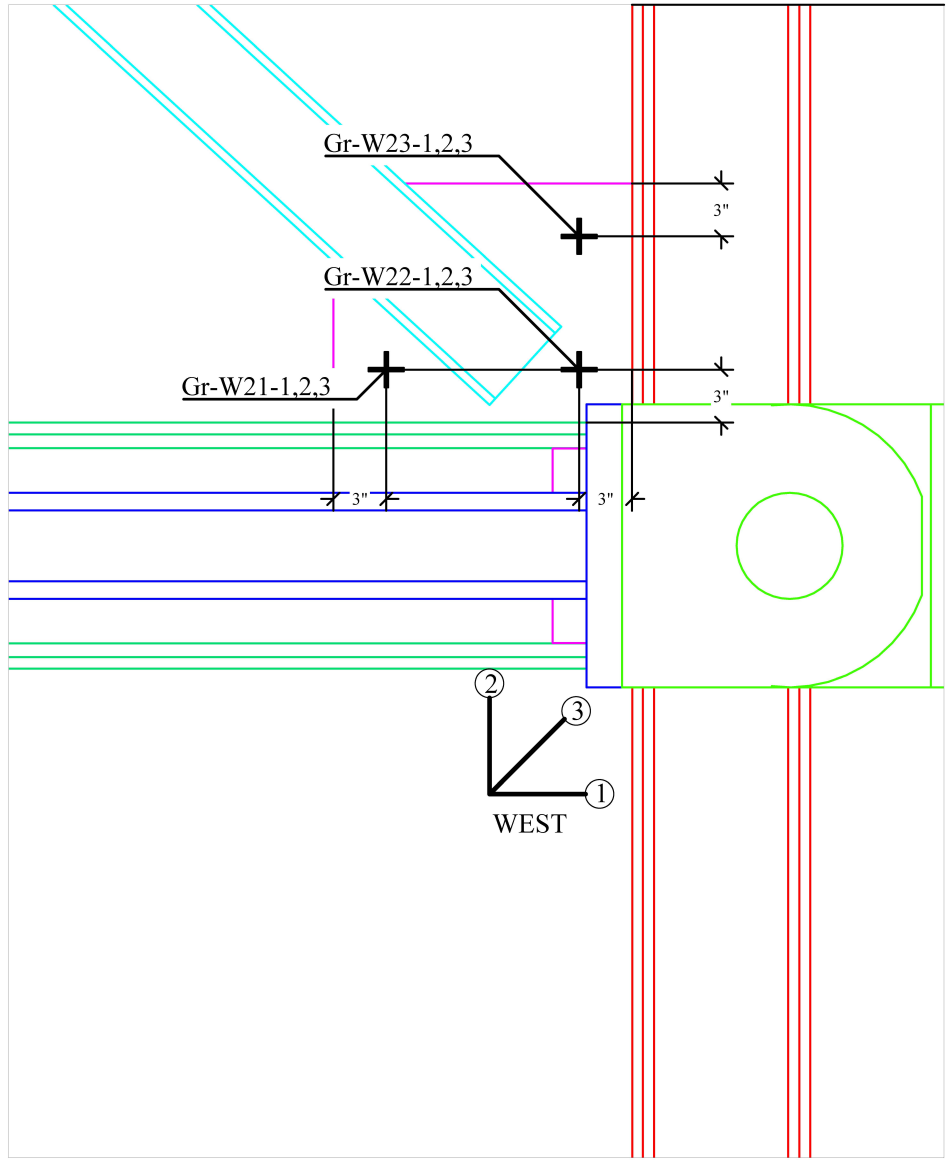
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7/18/2014

Sensor Title
Column Rosettes

Sheet
S9





Gr-W23-1,2,3

Gr	Gusset rosette	
E	East	1 1st Floor
W	West	2 2nd Floor
1,2,3	Location, See Drawing	
	(1–inner bottom, 2–outer bottom, 3–outer top)	
1,2,3	1–0deg. 2–90deg. 3–135deg.	

Located on South Face of gusset.

Project

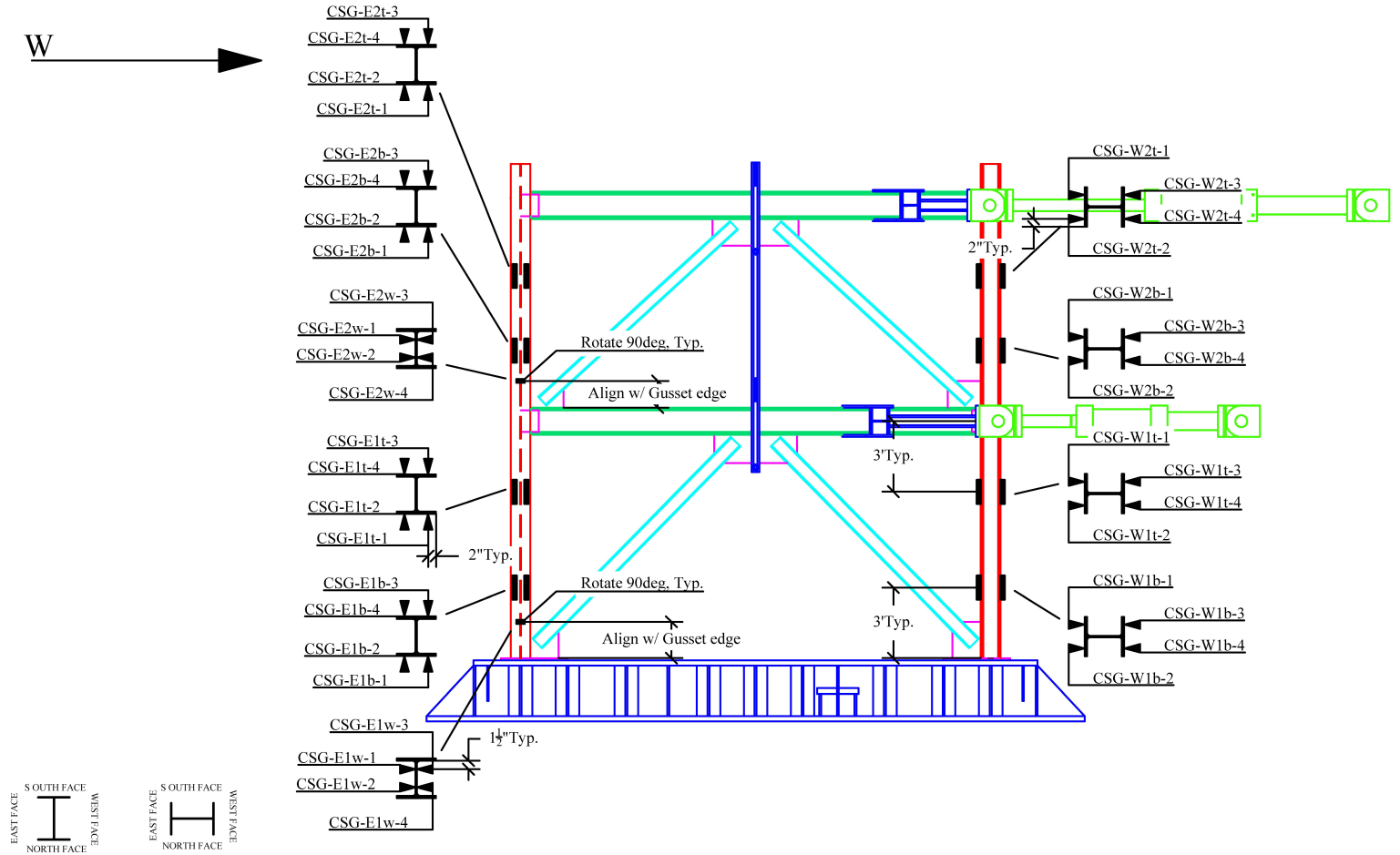
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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7/18/2014

Sensor Title
Gusset Rosettes

Sheet
S 1 0



CSG-E1b-1

CSG		Column Strain Gage					
E	East	1	1st Floor	b	bottom	w	web
W	West	2	2nd Floor	t	top		
1,2,3,4		Location, See Drawing					

Project

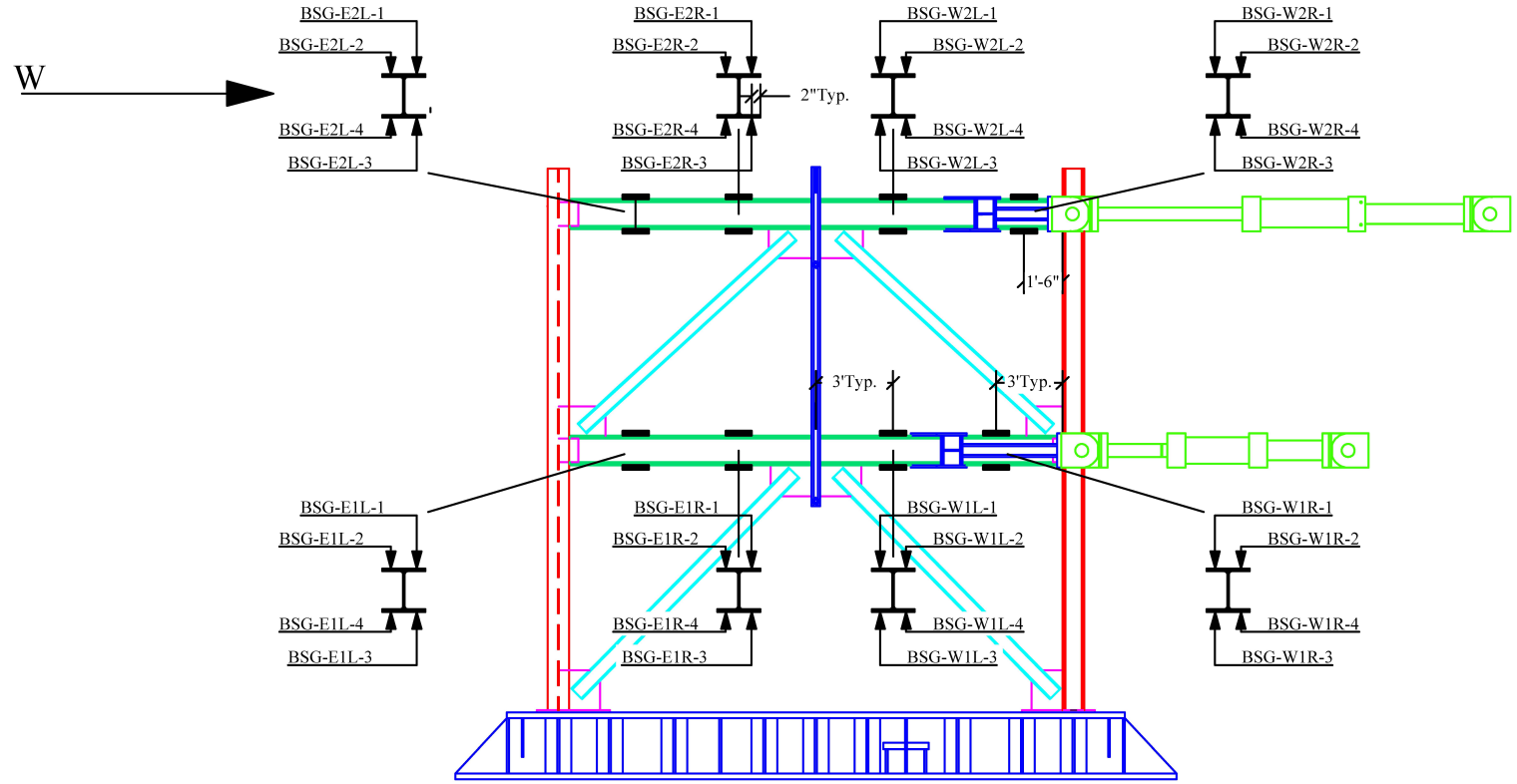
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Sensor Title
Strain Gage

Sheet
S 1 1





BSG-E1L-1

BSG	Beam Strain Gage				
E	East	1	1st Floor	L	left
W	West	2	2nd Floor	R	right
1,2,3,4	Location, See Drawing				

Project

Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

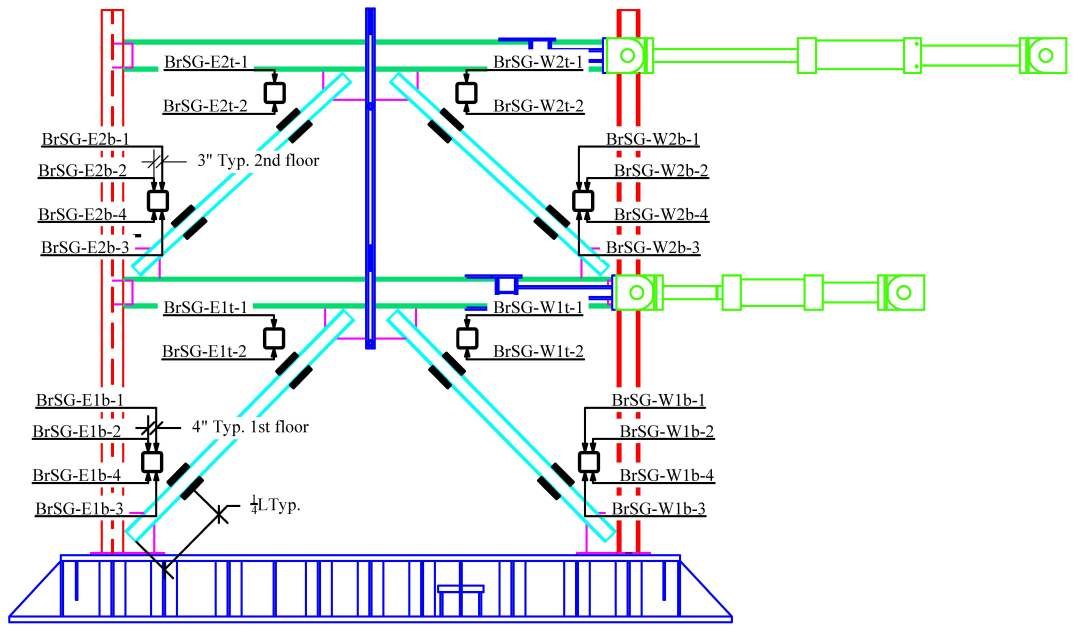
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Date
7/18/2014

Sensor Title
Beam Strain Gage

Sheet
S 1 2

W





BrSG-E1b-1

BrSG	Brace Strain Gage				
E	East	1	1st Floor	b	bottom
W	West	2	2nd Floor	t	top
1,2,3,4	Location, See Drawing				

Project

Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

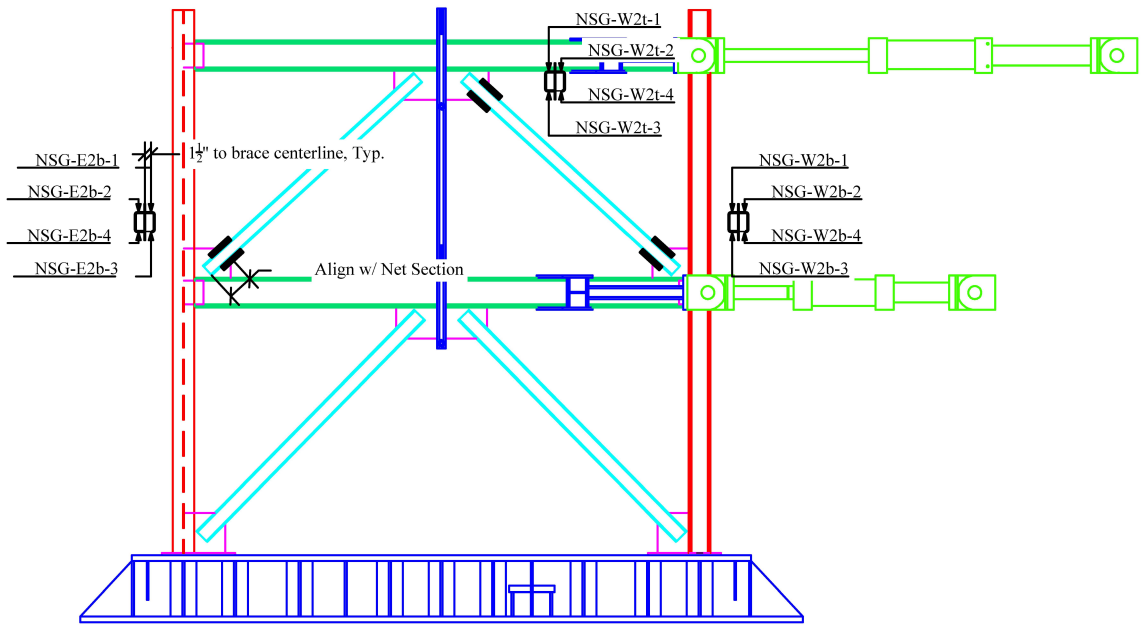
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7/18/2014

Sensor Title
Brace Strain Gage

Sheet
S 1 3

W





NSG-E1b-1

NSG	Net Section Strain Gage				
E	East	1	1st Floor	b	bottom
W	West	2	2nd Floor	t	top
1,2,3,4	Location, See Drawing				

Project

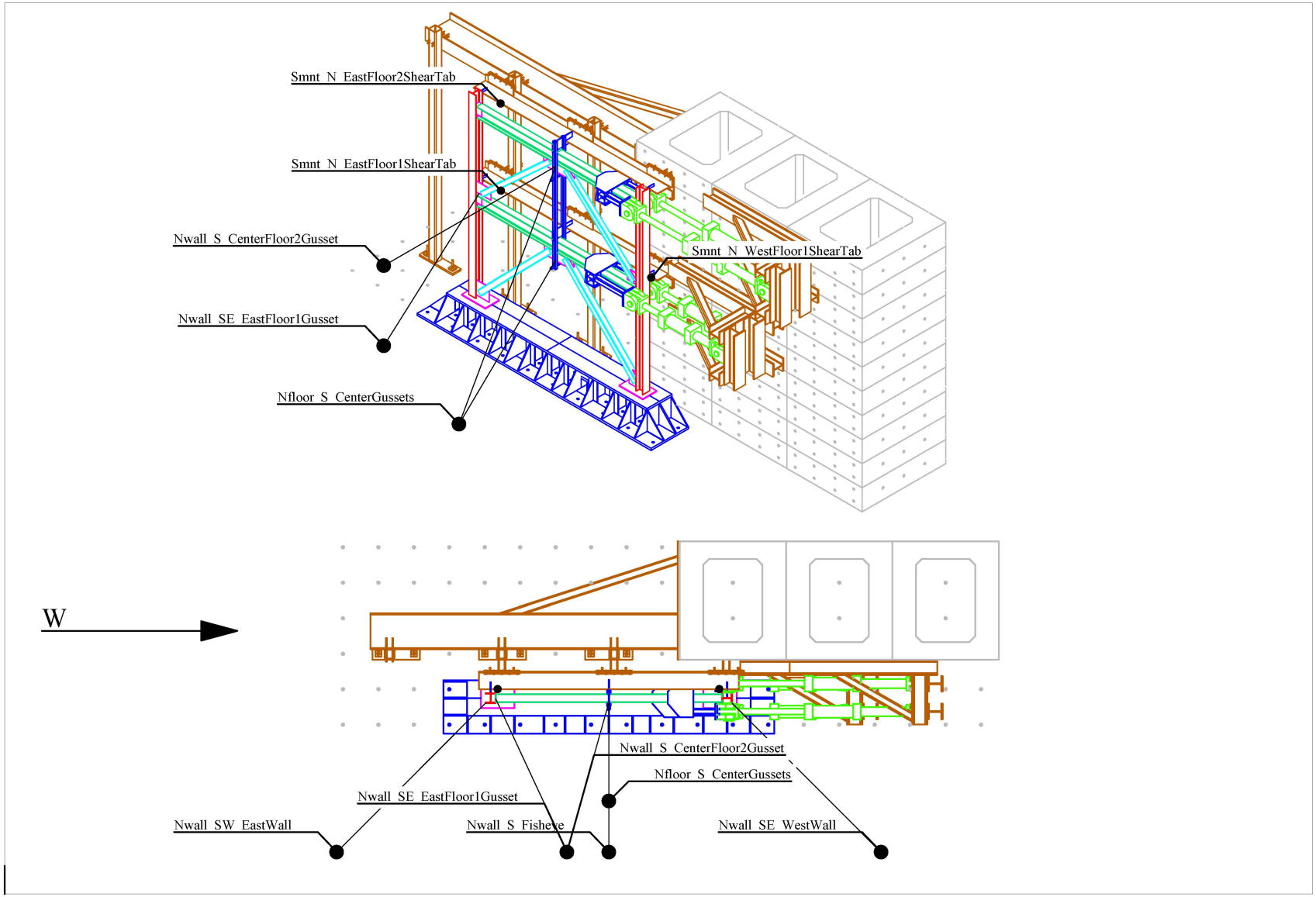
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7/18/2014

Sensor Title
Net Section Strain Gage

Sheet
S14



Project

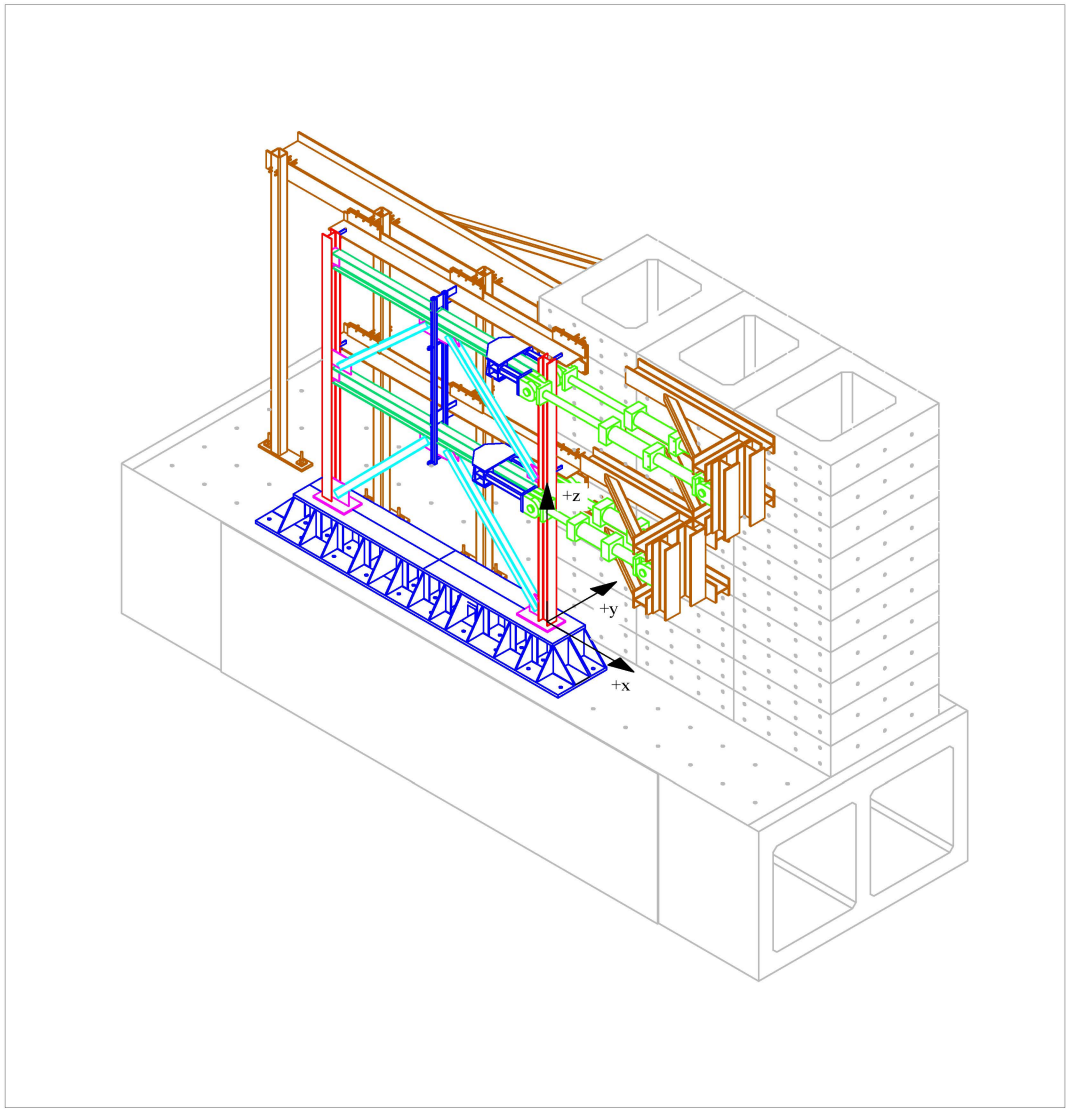
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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7/18/2014

Sensor Title
Cameras

Sheet
S15



Project

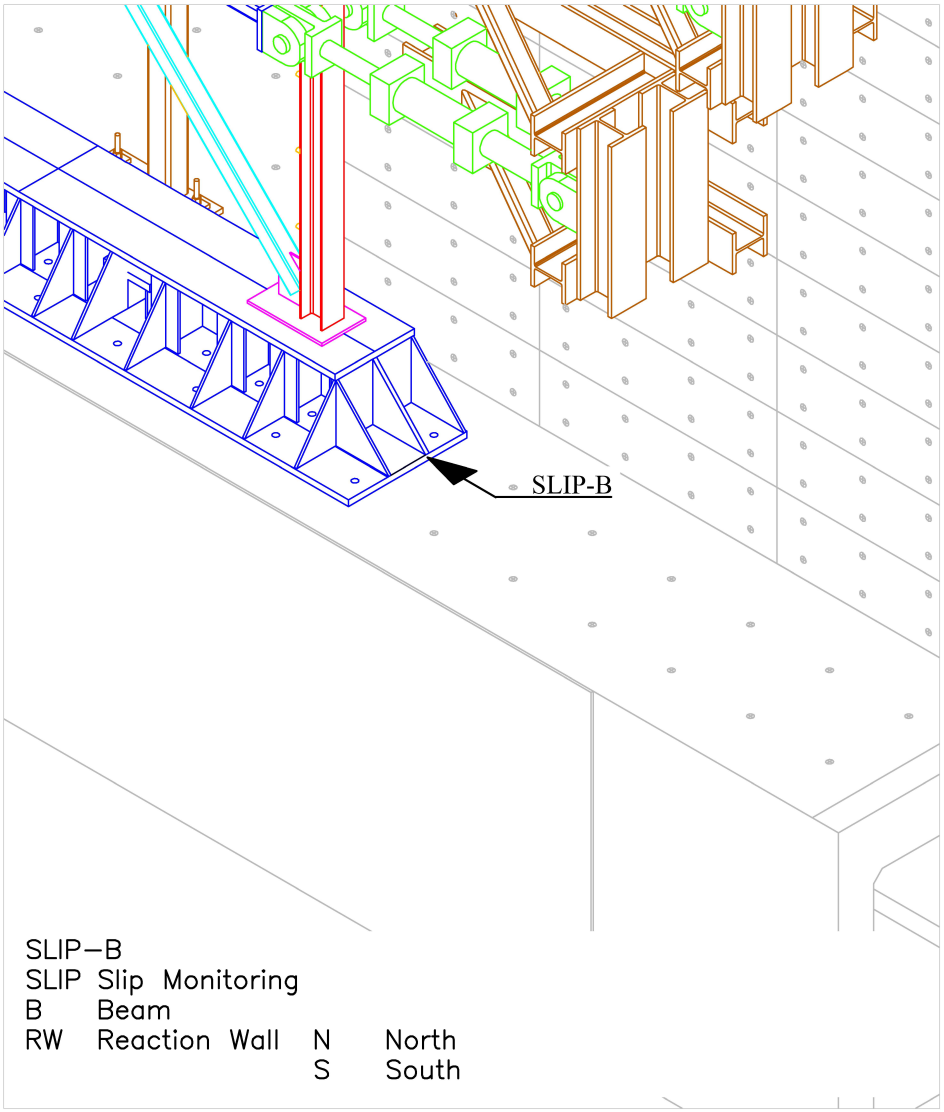
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

Drawn by
Barb Simpson

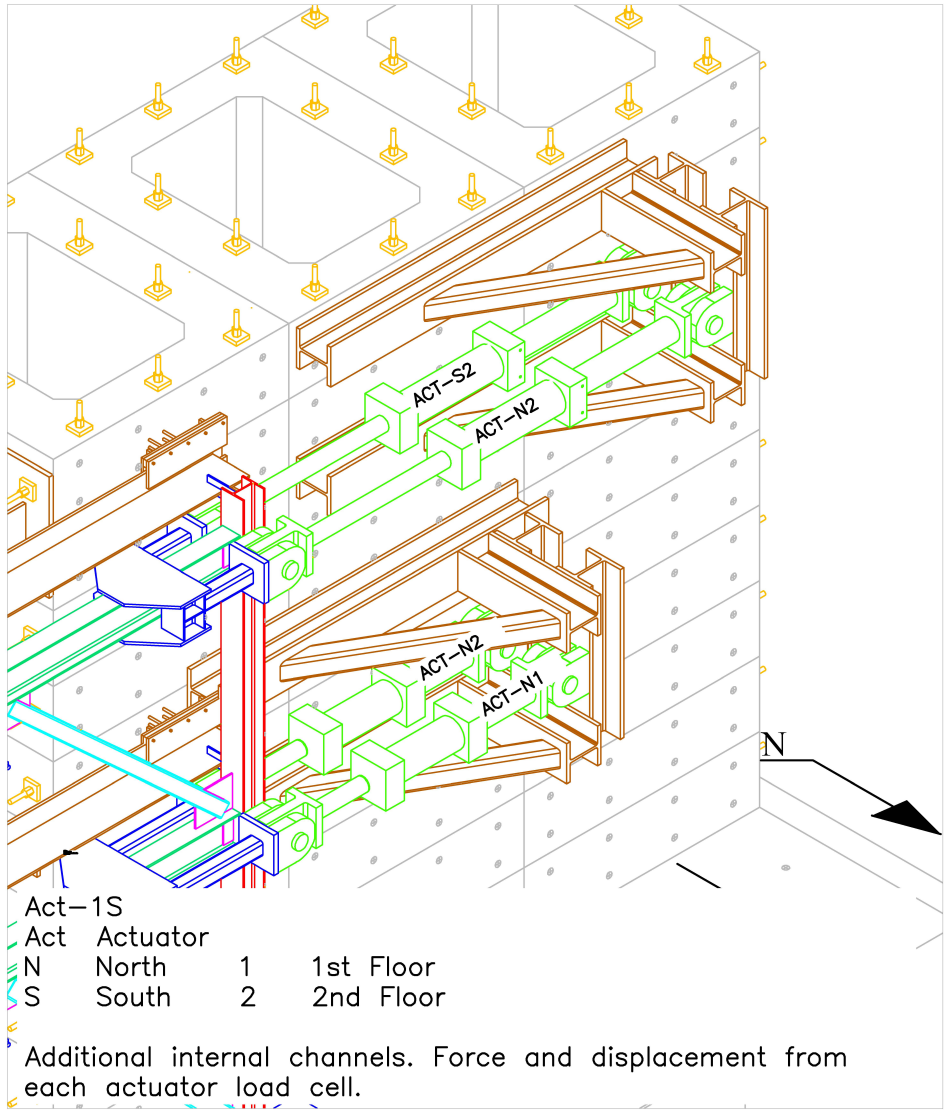
Date
7/18/2014

Sensor Title
NCBF–B–2

Sheet
S0



SLIP–B
SLIP Slip Monitoring
B Beam
RW Reaction Wall N North
S South



Act–1S
Act Actuator
N North 1 1st Floor
S South 2 2nd Floor

Additional internal channels. Force and displacement from each actuator load cell.

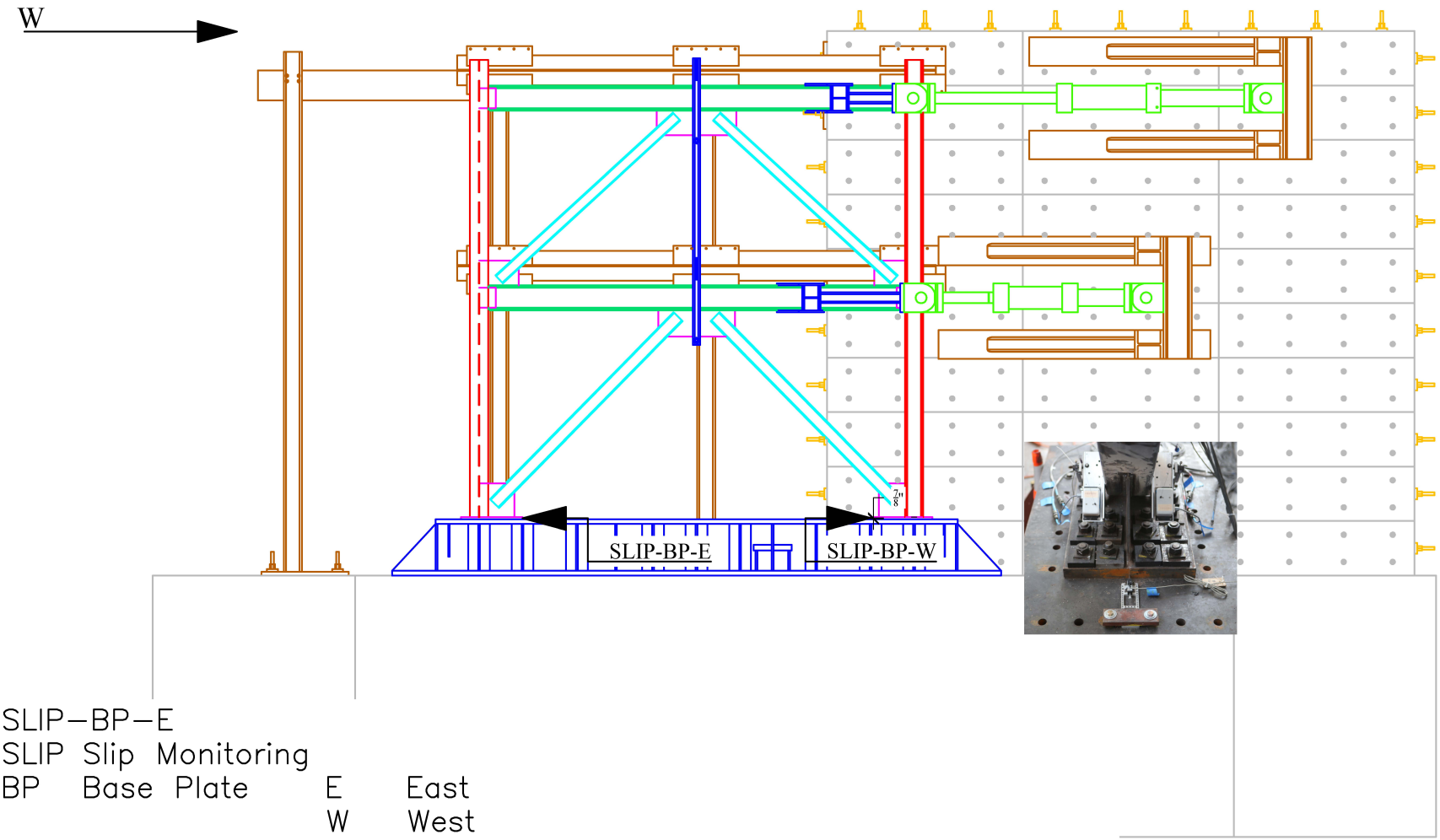
Project
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Date
7/18/2014

Sensor Title
Test Monitoring

Sheet
S1



SLIP–BP–E
SLIP Slip Monitoring
BP Base Plate E East
W West

Align with braced frame centerplane at middle of base plate.

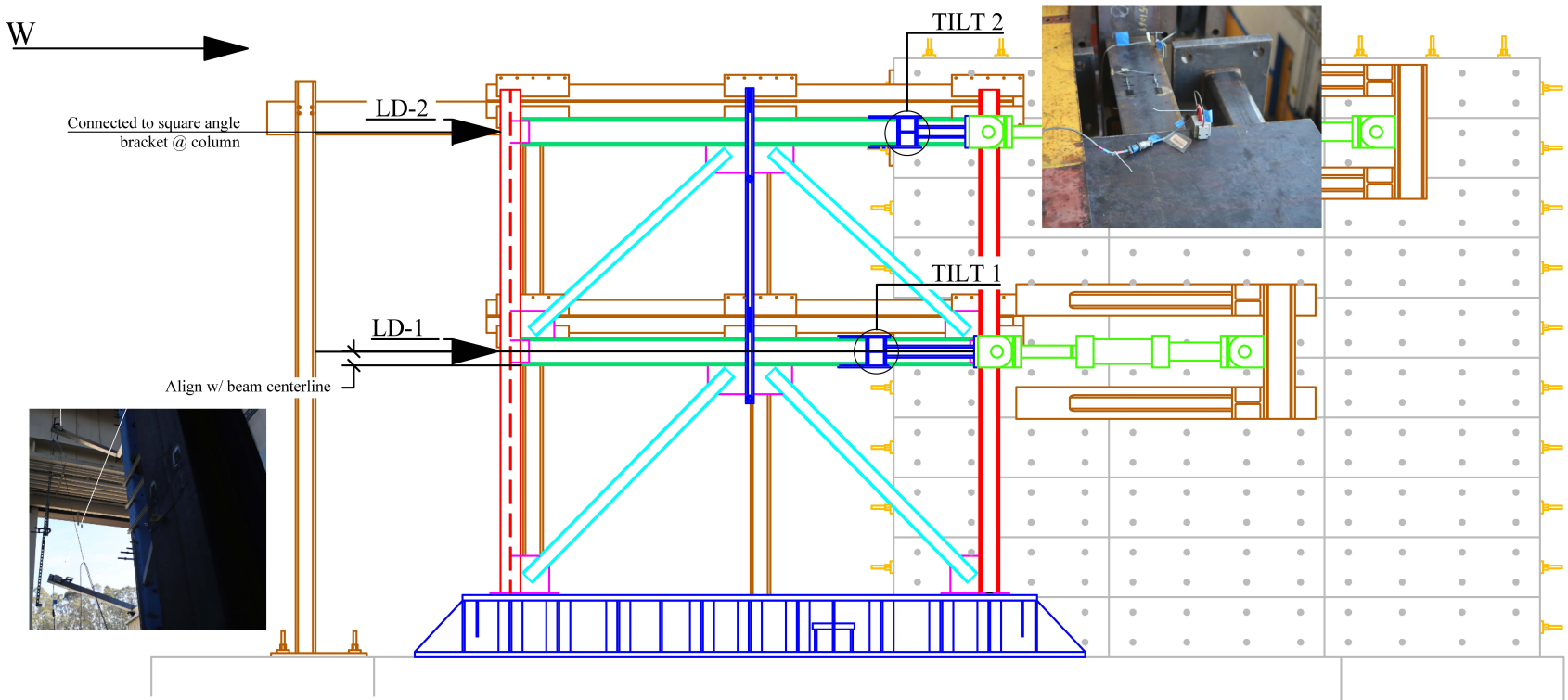
Project
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Date
7/18/2014

Sensor Title
Slip LVDT

Sheet
S2



LD-1
LD Lateral Displacement Monitoring
1 1st Floor
2 2nd Floor

Align with beam centerline at each floor. Connect to supporting frame column by elbowed HSS Aluminum pieces.

TILT1
TILT Accelerometer monitoring angle of actuator brackets.
1 1st Floor
2 2nd Floor

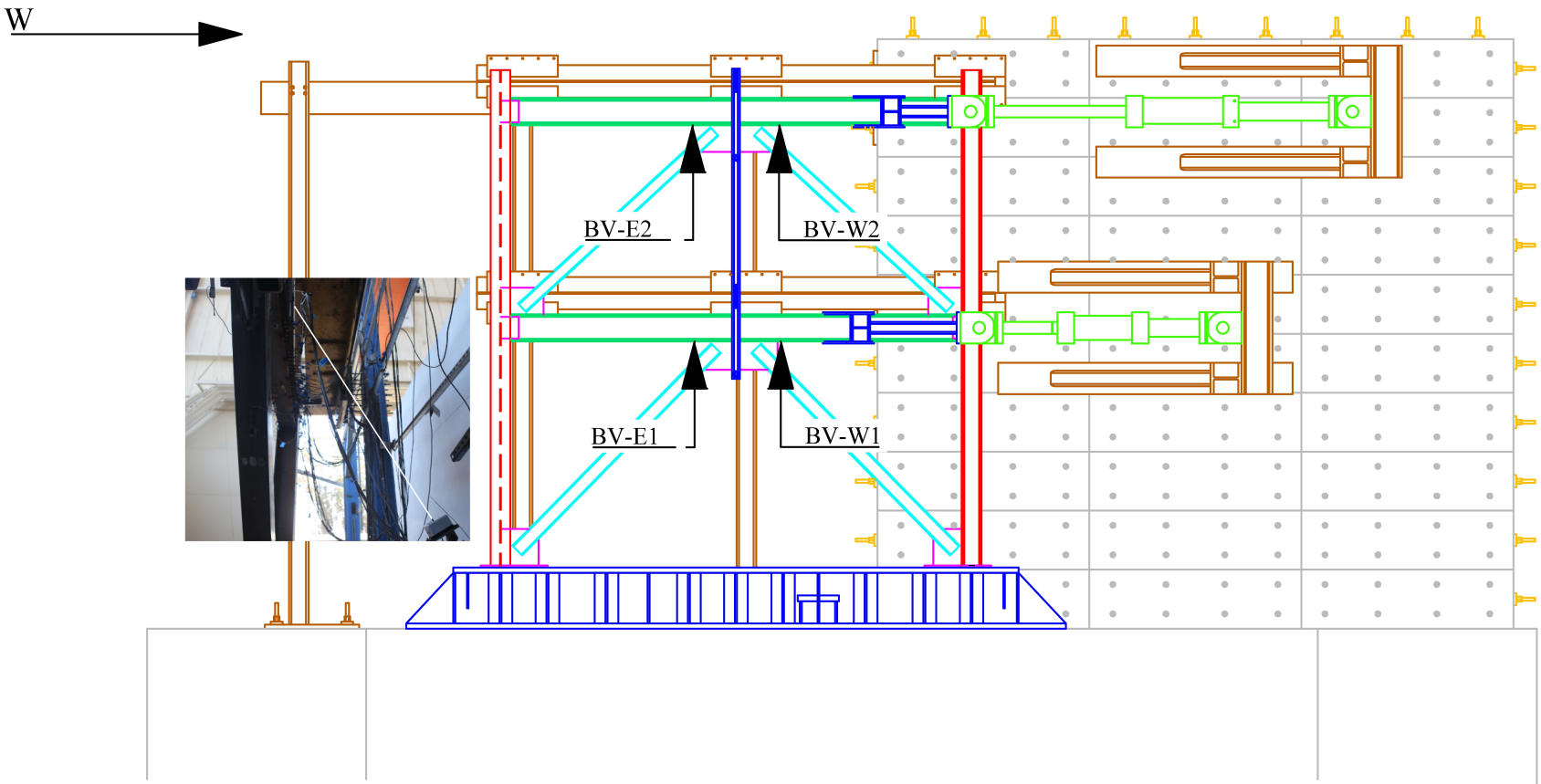
Project
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

Drawn by
Barb Simpson

Date
7/18/2014

Sensor Title
Story Displacement

Sheet
S3



BV-E1
BV Beam Vertical Displacement
E East 1 1st Floor
W West 2 2nd Floor

Align with beam bottom flange and gusset edge.
(2) on either side of beam frame.

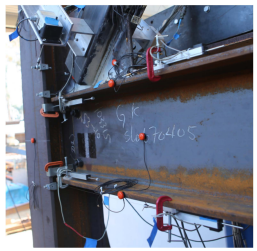
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Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

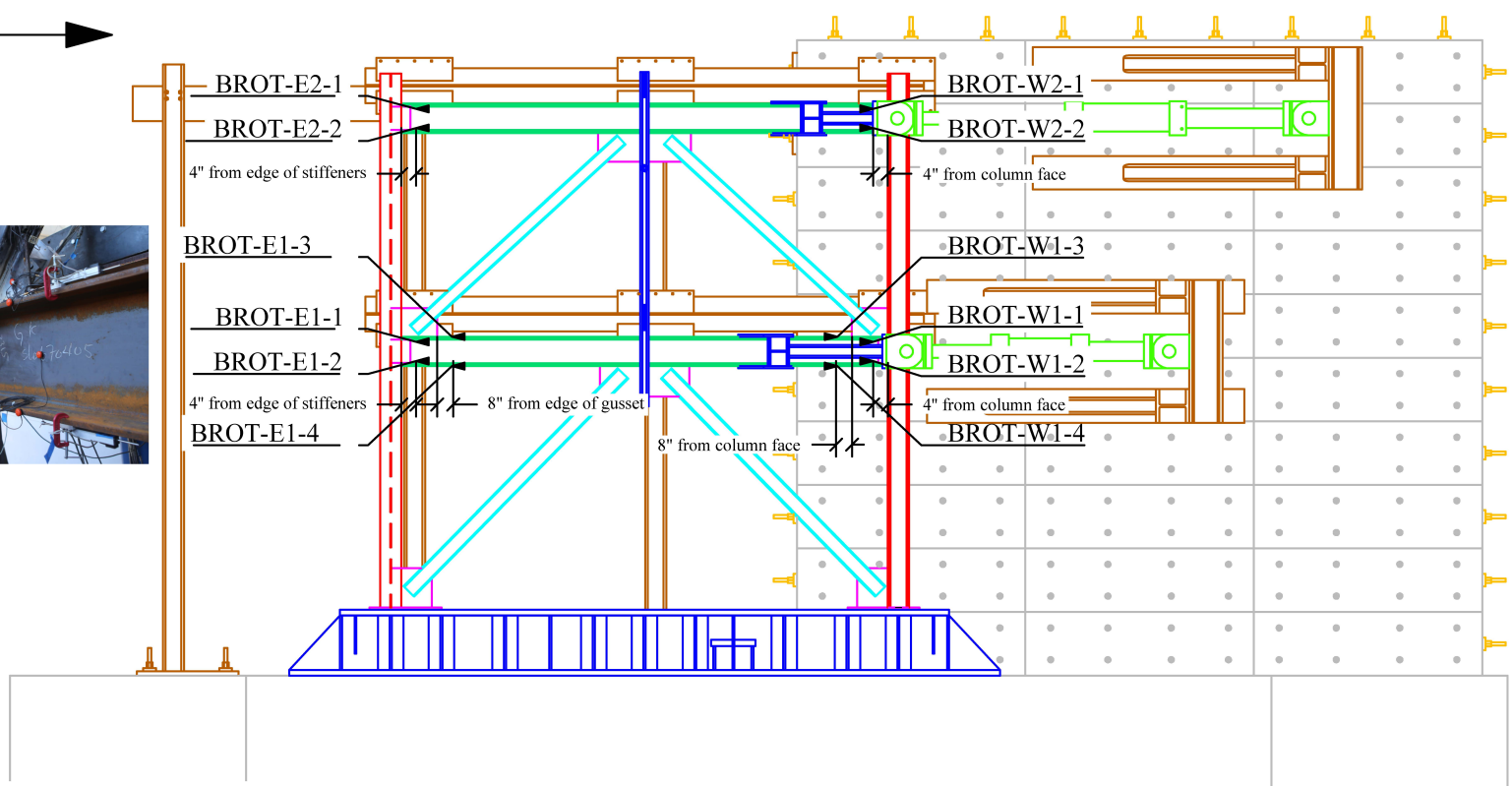
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Date
7/18/2014

Sensor Title
Vertical Beam WirePot

Sheet
S4





BROT-E1-1
BROT Beam Rotation Monitoring
E East 1 1st Floor
W West 2 2nd Floor
1,2 Outer Location, see drawing (1-top, 2-bottom)
3,4 Inner Location, see drawing (3-top, 4-bottom)

Target at column face (at stiffener for weak-axis column and flange for strong-axis column) at each floor.

Project

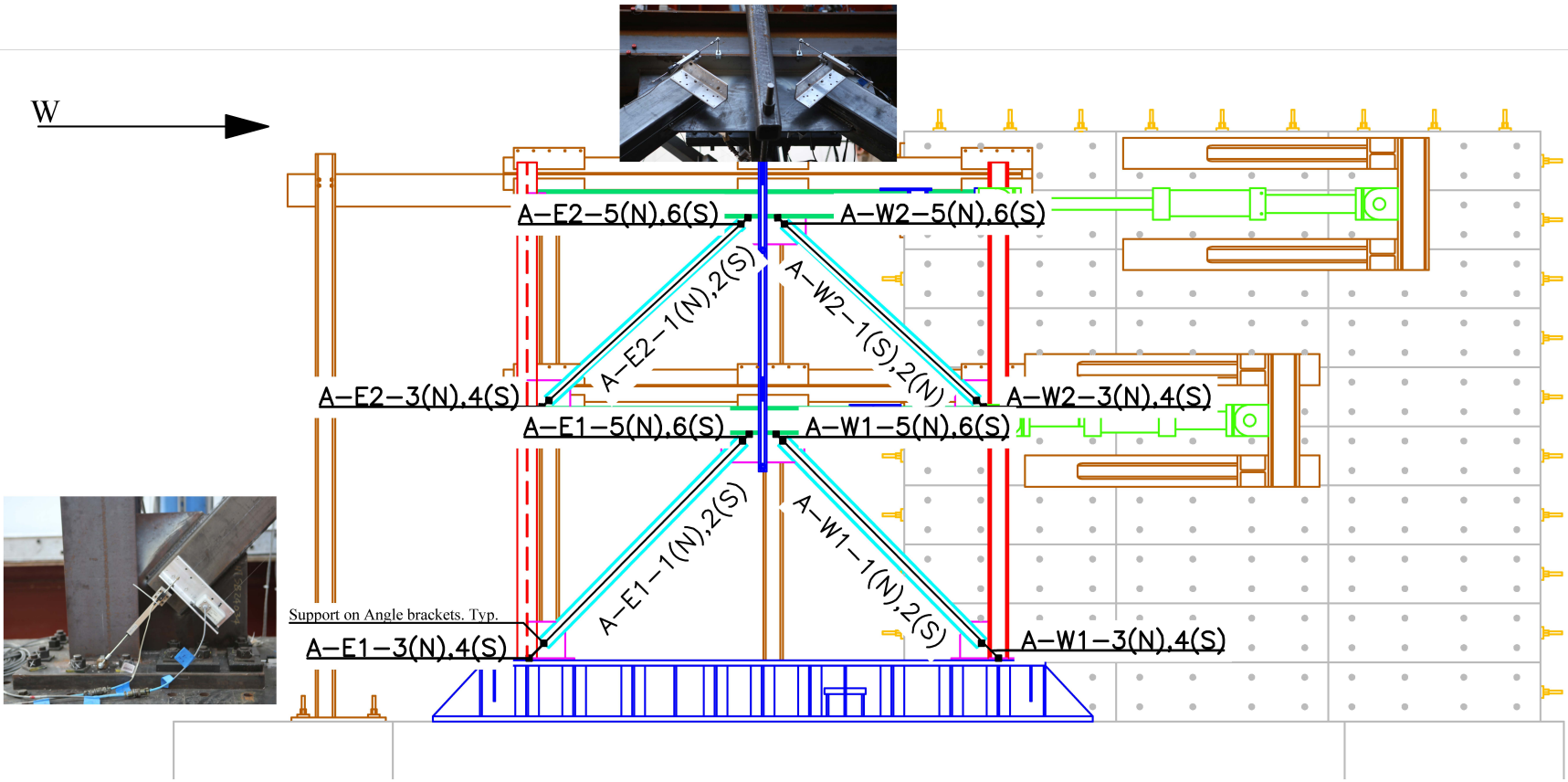
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Barb Simpson

Date
7/18/2014

Sensor Title
Beam Rotation LVDT

Sheet
S5



A–E1–1
A Axial Deformation of Brace
E East 1 1st Floor
W West 2 2nd Floor
N North Facing Front View
S South Facing Back View
1,2 Wire pot from brace end-to-end
3,4,5,6 LVDT, see drawing for location (3,4-lower, 5,6-upper)

Brace axial deformation monitoring along the axis of brace. Support on brackets 4" or 5" from face of brace on both sides of brace. LVDT at ends of brace to monitor brace out–of–plane rotation. Wire pot to measure brace elongation.

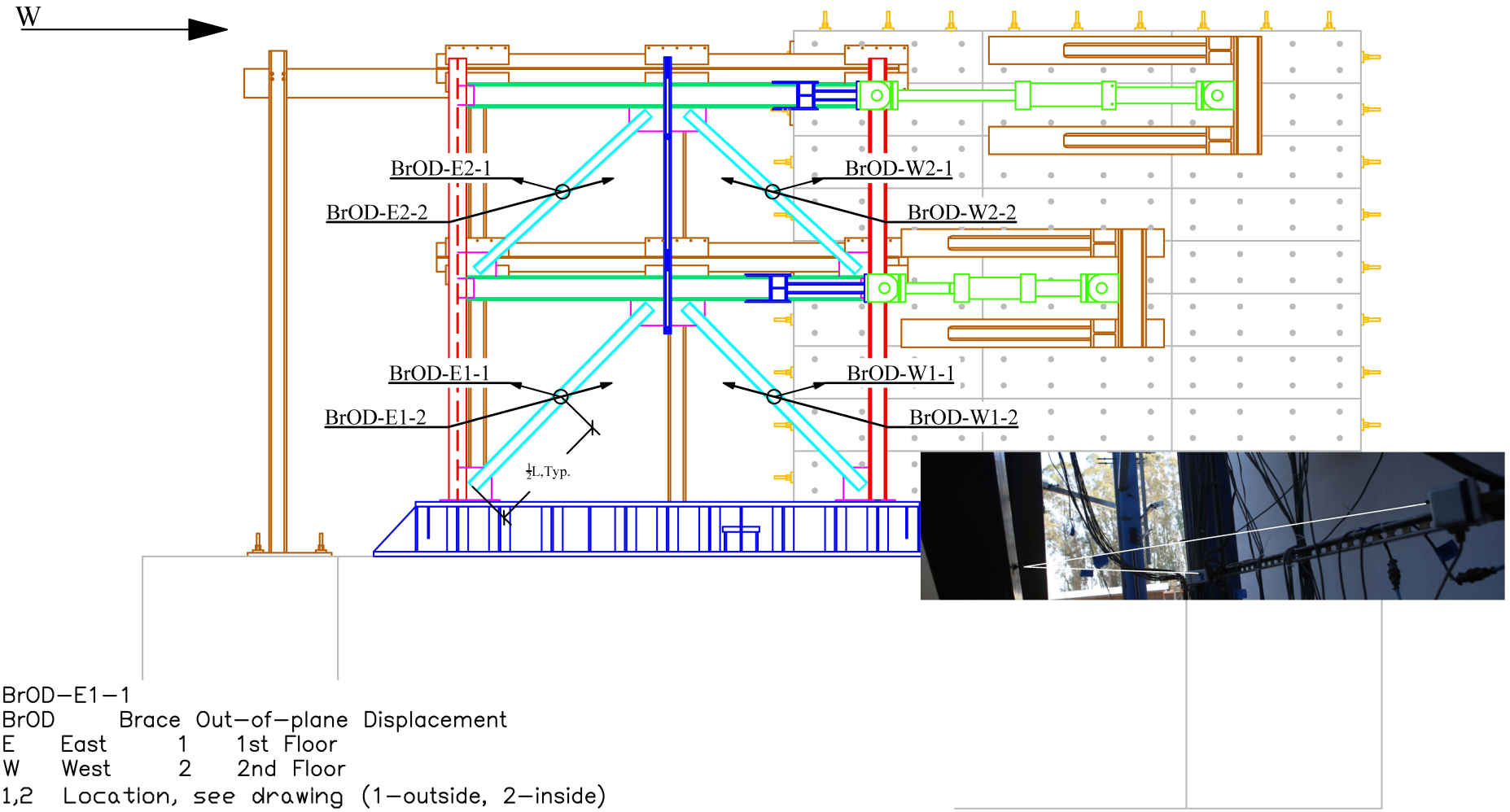
Project
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Date
7/18/2014

Sensor Title
Brace Axial

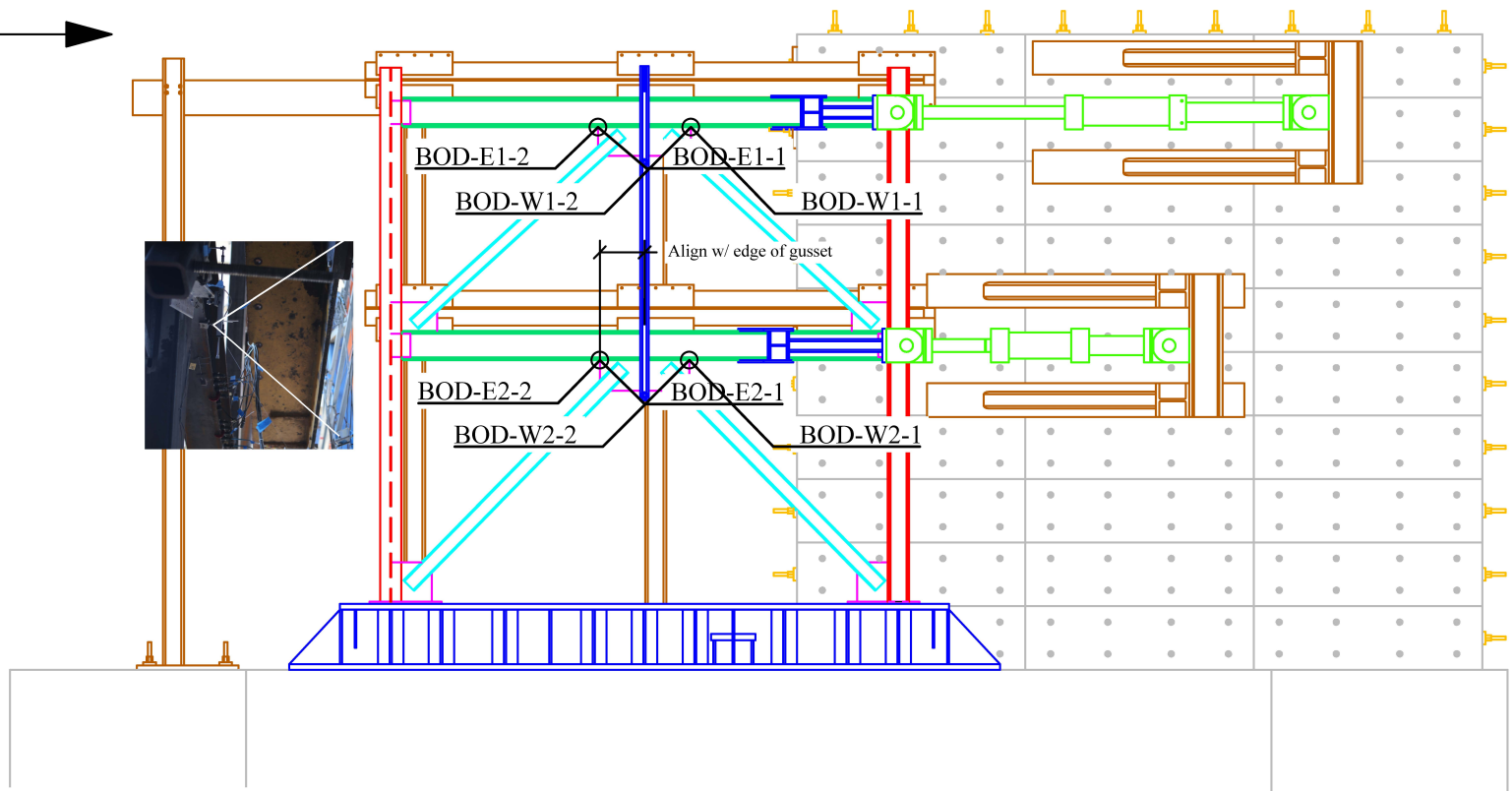
Sheet
S6



BrOD–E1–1
BrOD Brace Out–of–plane Displacement
E East 1 1st Floor
W West 2 2nd Floor
1,2 Location, see drawing (1–outside, 2–inside)

(2) Wire Pots per Brace. Align at Brace Centerline. Connect to supporting frame. Target welded at brace midpoint.

	Project: Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames	Drawn by: Barb Simpson Date: 7/18/2014 Sensor Title: Brace Out–of–Plane	Sheet: S7



BOD–E1–1
BOD Beam Out–of–plane Displacement
E East 1 1st Floor
W West 2 2nd Floor
1,2 Location, see drawing (1–top, 2–bottom)

Align with Edge of Gusset. Target at beam flange.

Project

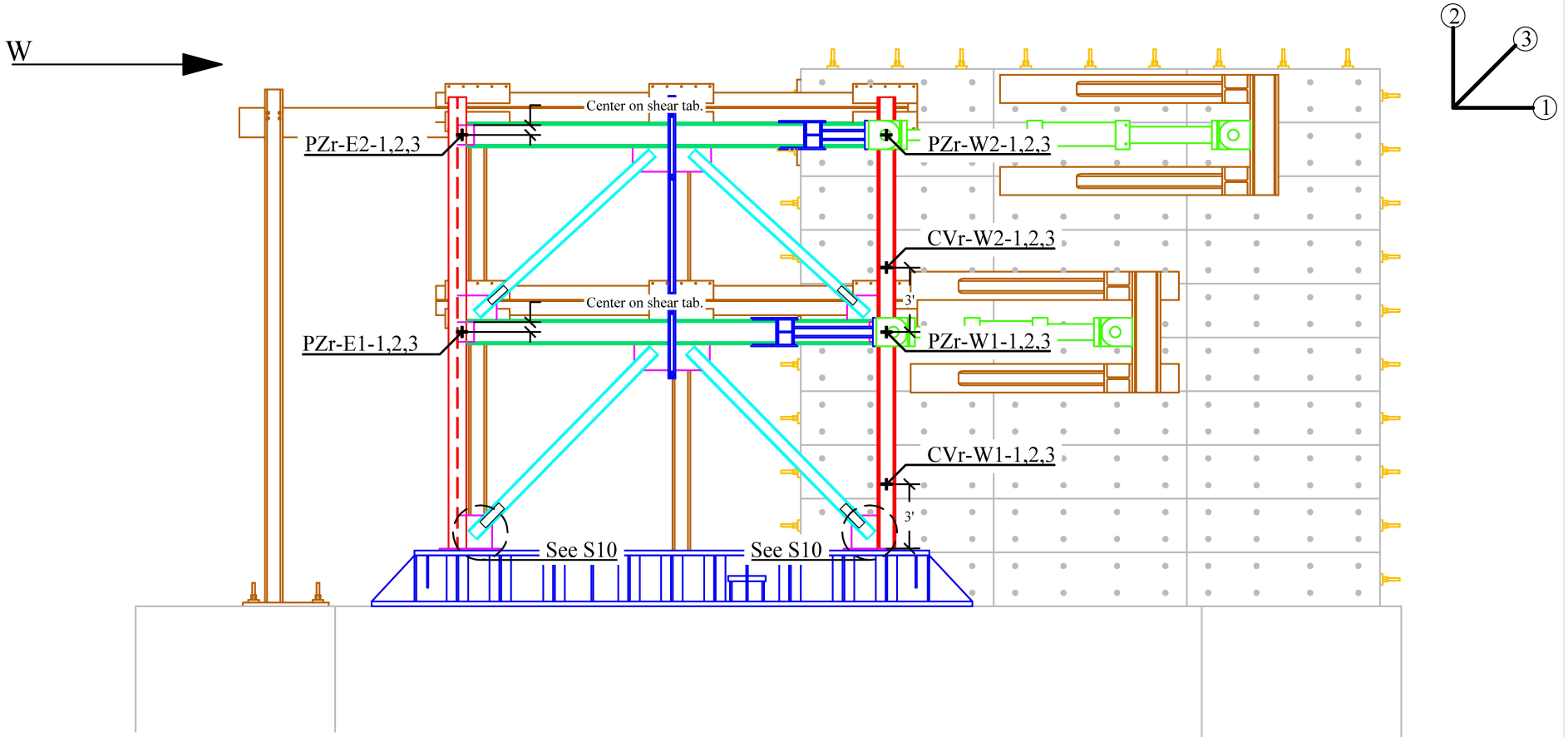
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

Drawn by
Barb Simpson

Date
7/18/2014

Sensor Title
Beam Monitoring

Sheet
S8



PZr-E1-1,2,3
CVr-E1-1,2,3

PZr	Panel Zone rosette		
CV4	Column Shear rosette		
E	East	1	1st Floor
W	West	2	2nd Floor
1,2,3	1–0deg.	2–90deg.	3–135deg.

Project

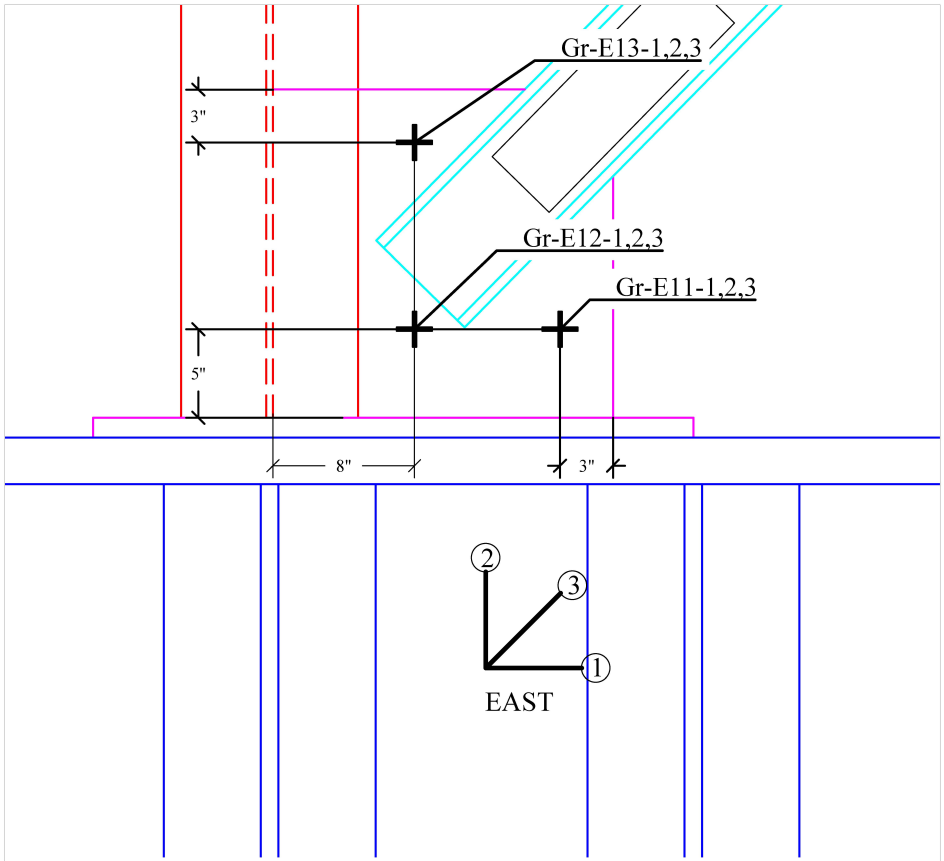
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

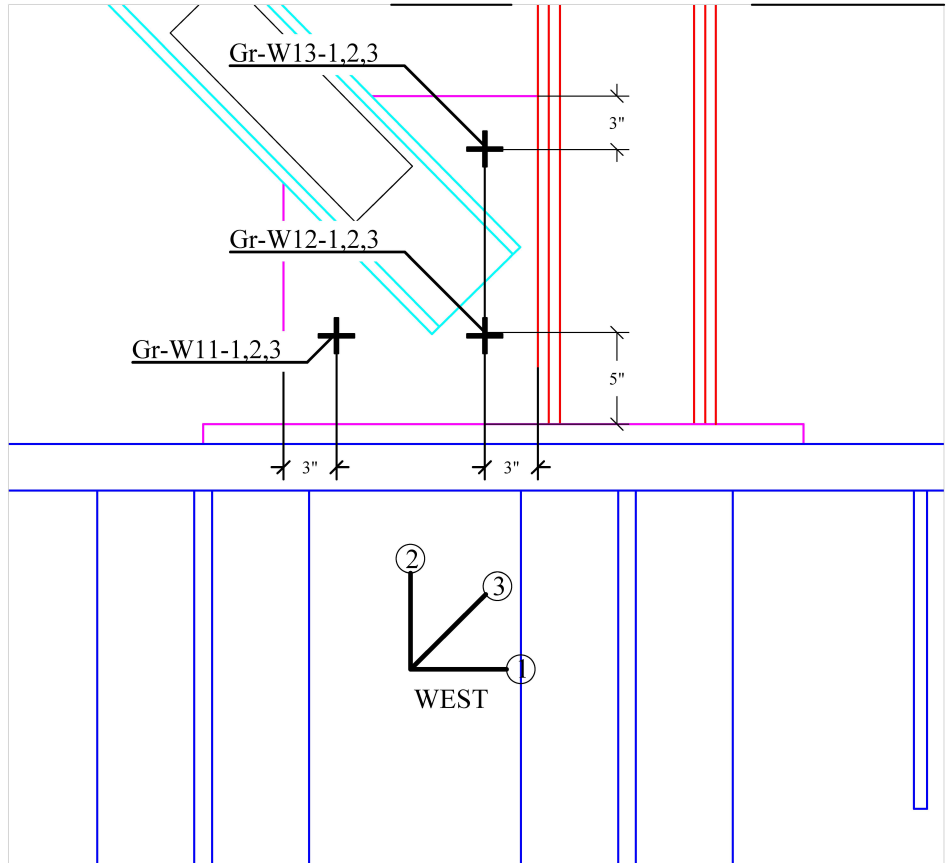
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Barb Simpson

Date
7/18/2014

Sensor Title
Column Rosettes

Sheet
S9





Gr-W13-1,2,3

Gr	Gusset rosette	
E East	1	1st Floor
W West	2	2nd Floor
1,2,3	Location, See Drawing	
	(1—inner bottom, 2—outer bottom, 3-outer top)	
1,2,3	1—0deg. 2—90deg. 3—135deg.	

Located on South Face of gusset.

Project

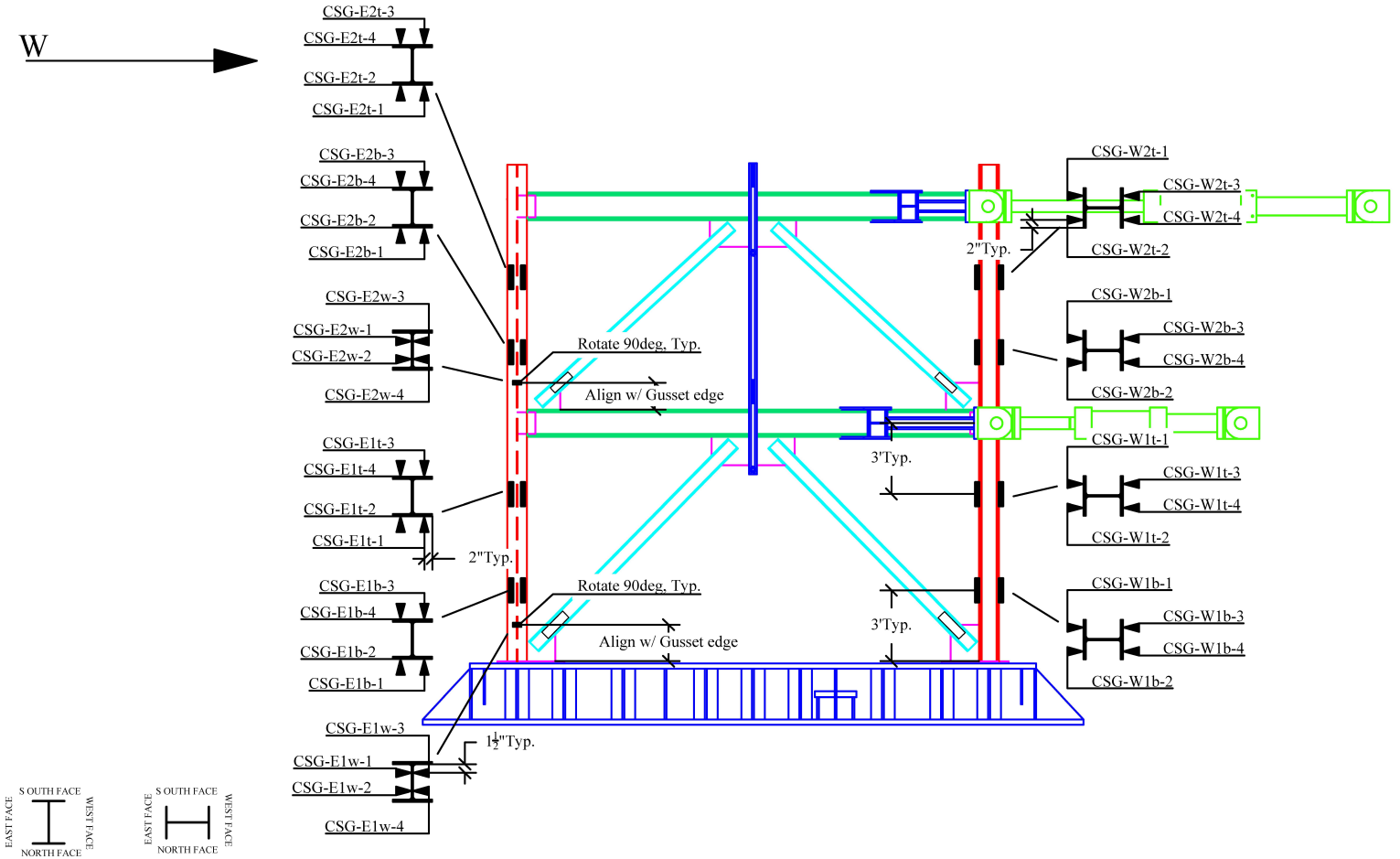
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Sensor Title
Gusset Rosettes

Sheet
S10



CSG-E1b-1

CSG		Column Strain Gage					
E	East	1	1st Floor	b	bottom	w	web
W	West	2	2nd Floor	t	top		
1,2,3,4		Location, See Drawing					

Project

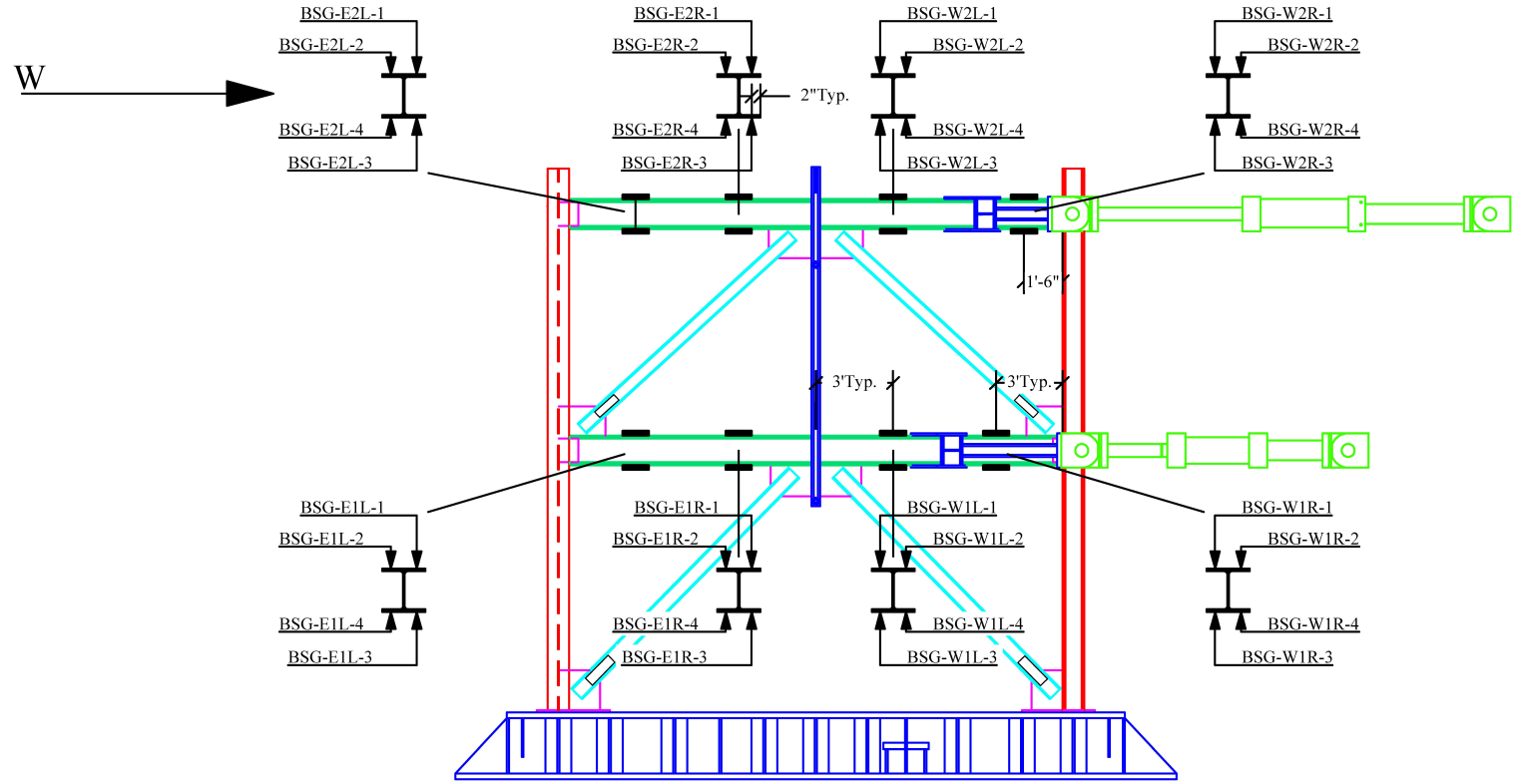
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Sensor Title
Column Strain Gages

Sheet
S 1 1





BSG-E1L-1

BSG	Beam Strain Gage				
E	East	1	1st Floor	L	left
W	West	2	2nd Floor	R	right
1,2,3,4	Location, See Drawing				

Project

Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

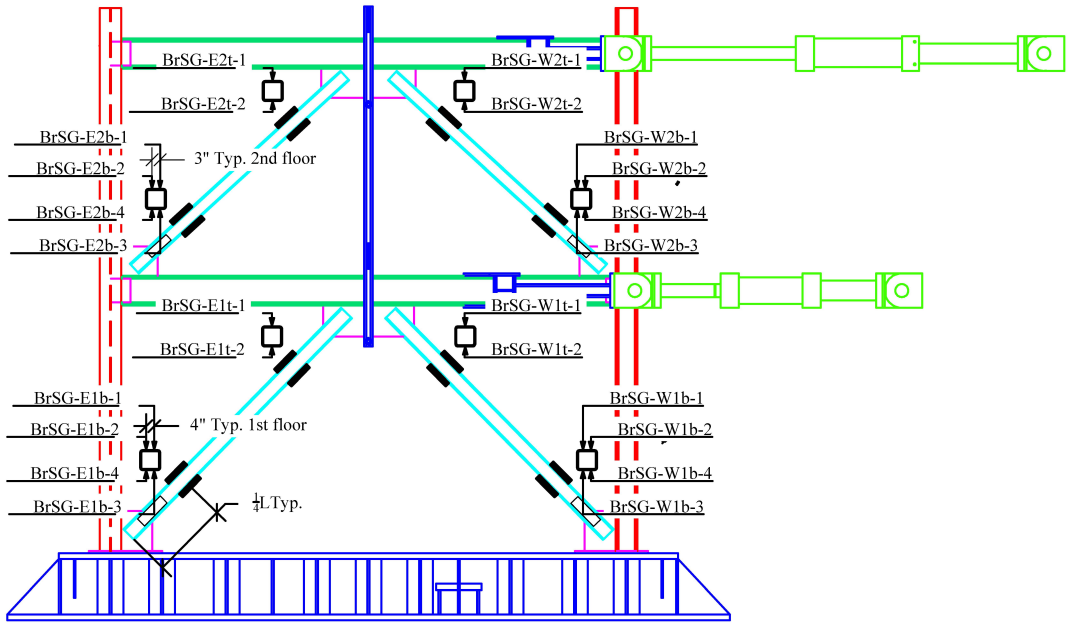
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Sensor Title
Beam Strain Gage

Sheet
S 1 2

W





BrSG-E1b-1

BrSG	Brace Strain Gage				
E	East	1	1st Floor	b	bottom
W	West	2	2nd Floor	t	top
1,2,3,4	Location, See Drawing				

Project

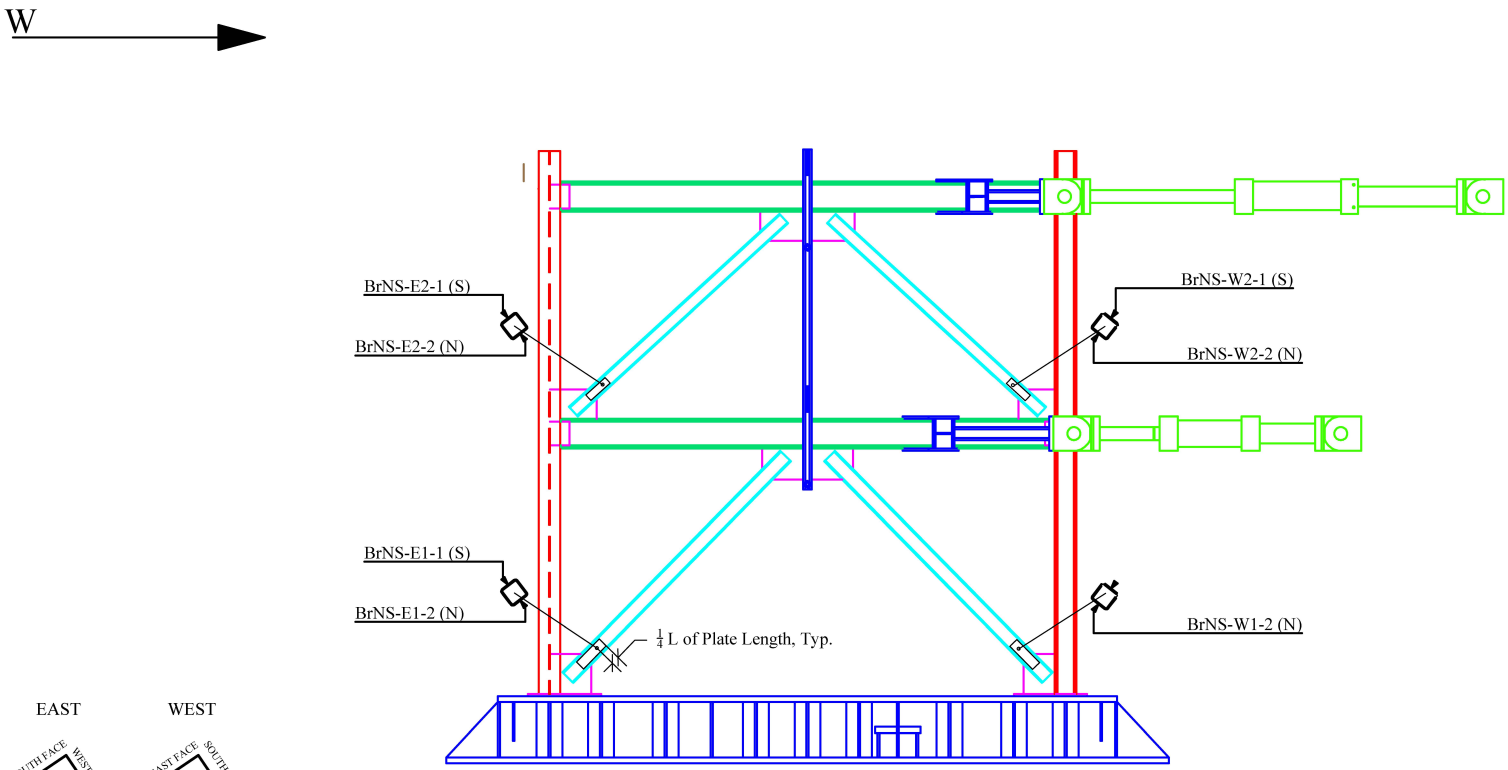
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Sensor Title
Brace Strain Gage

Sheet
S 1 3



BrNS-E1-1

BrNS		Net Section Strain Gage			
E	East	1	1st Floor	b	bottom
W	West	2	2nd Floor	t	top
(N)	North Facing				
(S)	South Facing				
1,2	Location, See Drawing				

Project

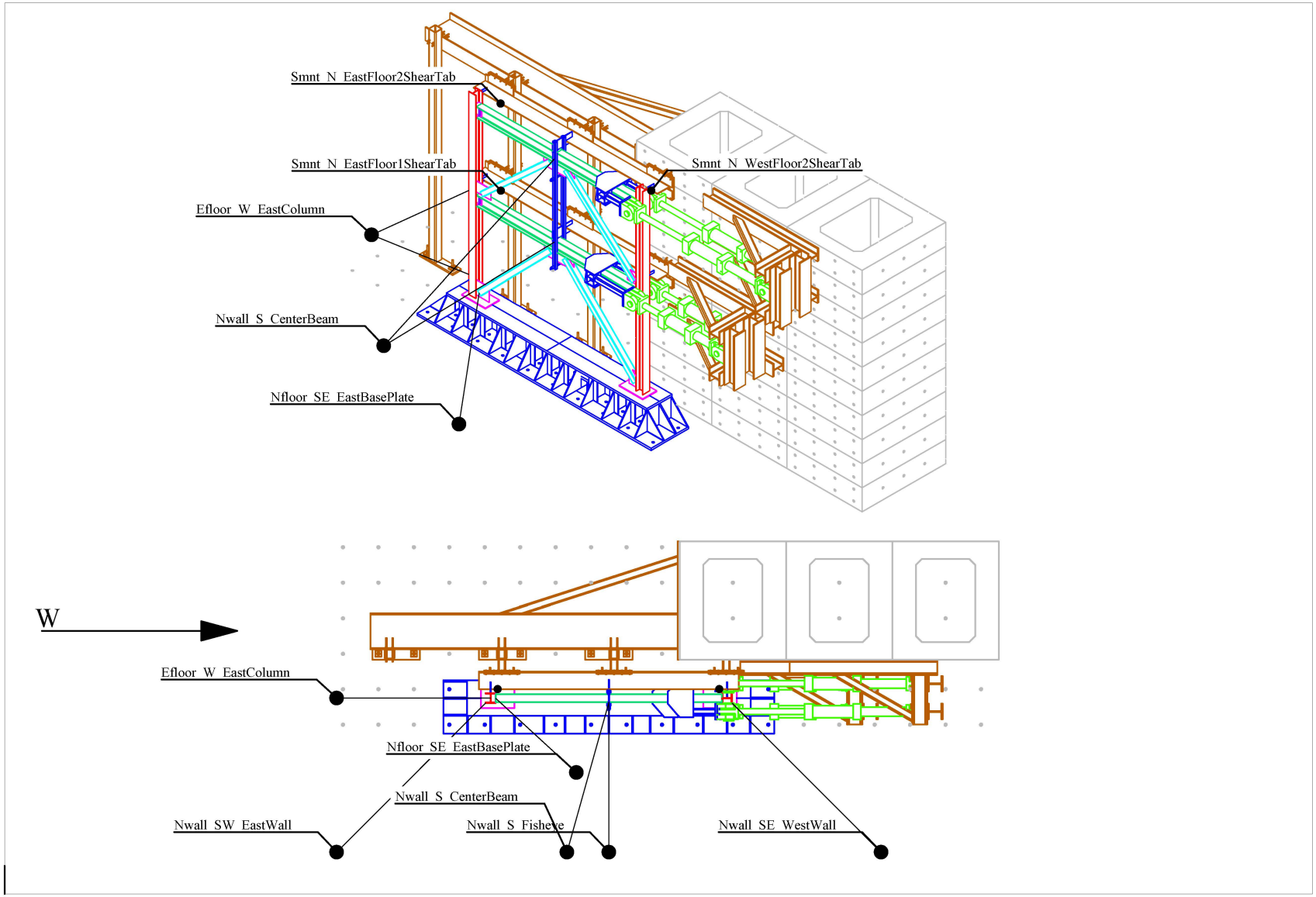
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Sensor Title
Net Section Strain Gage

Sheet
S14



Project

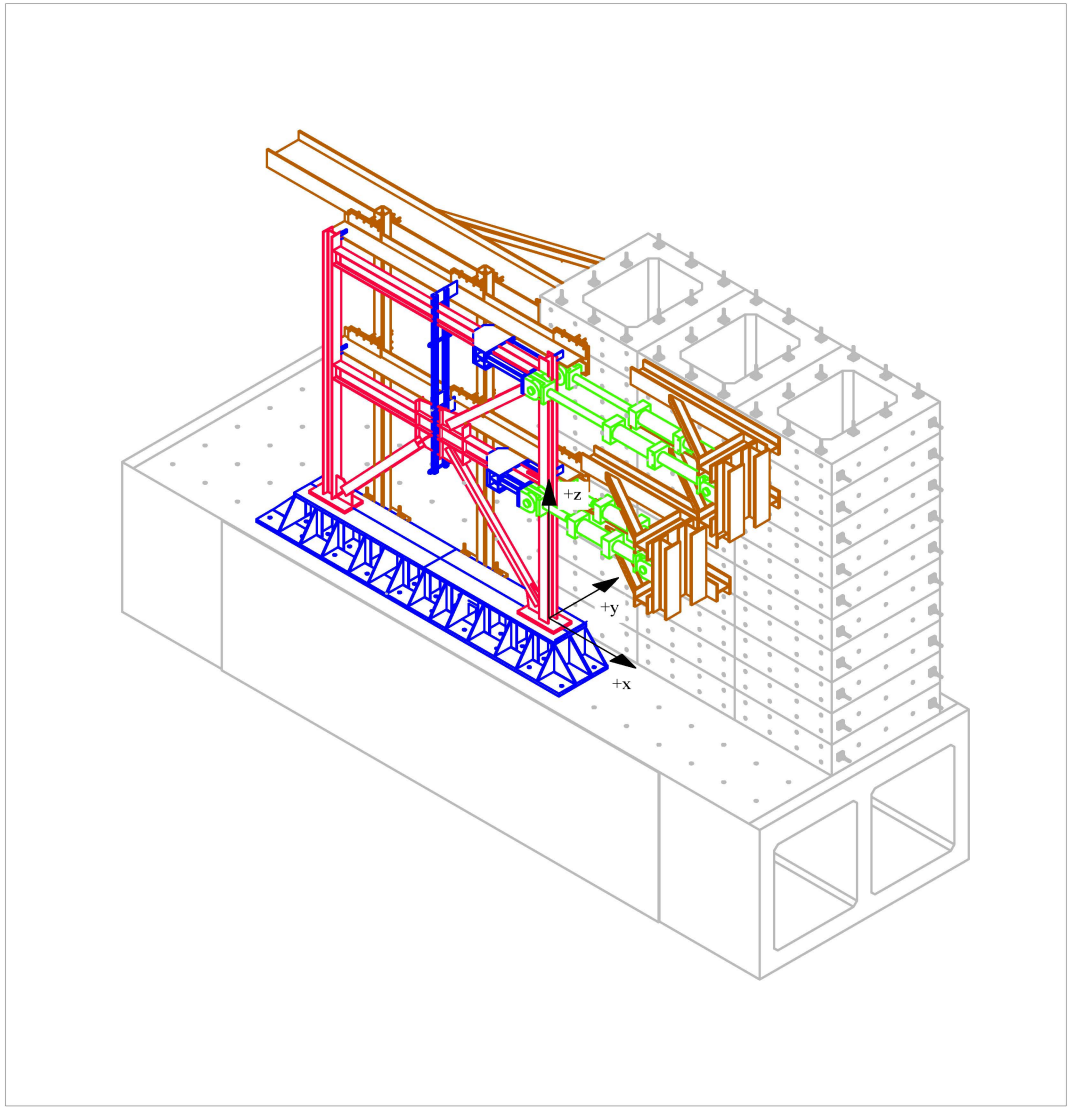
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Sensor Title
Cameras

Sheet
S15



Project

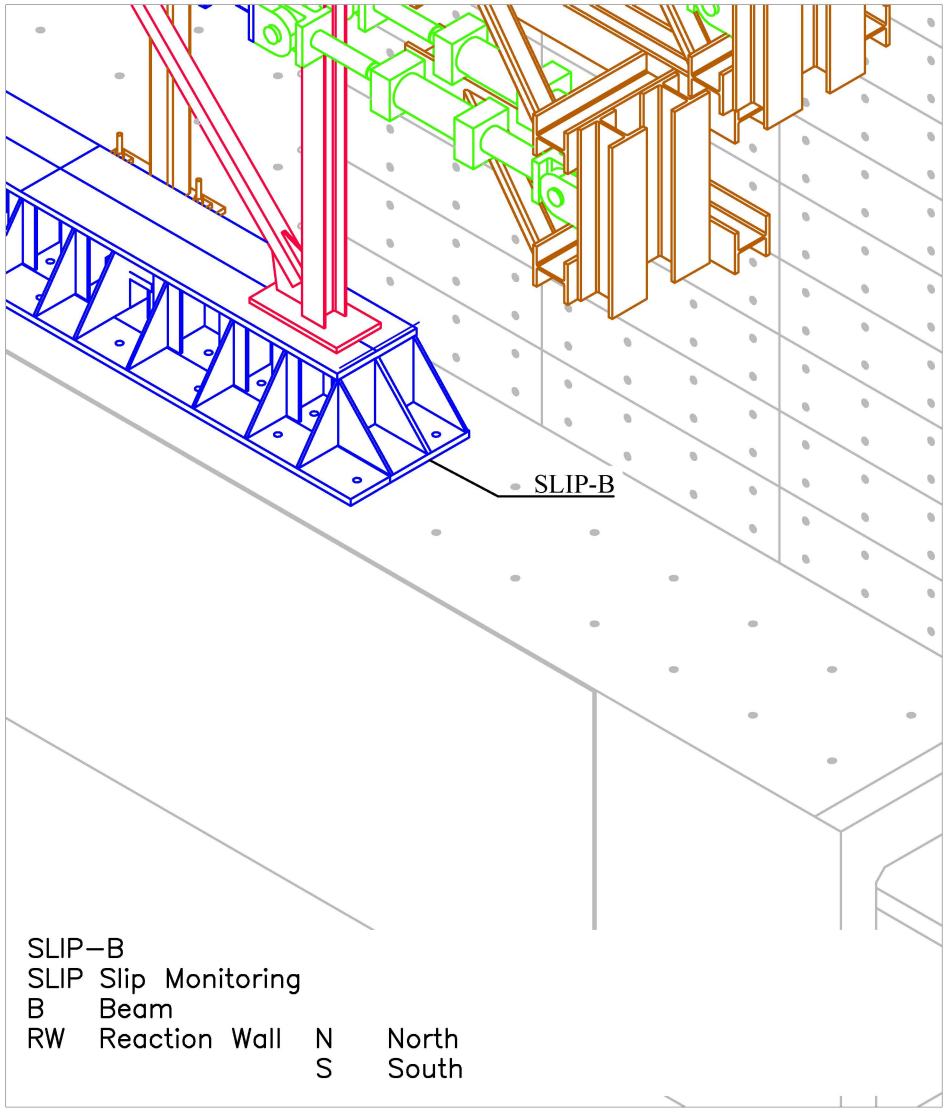
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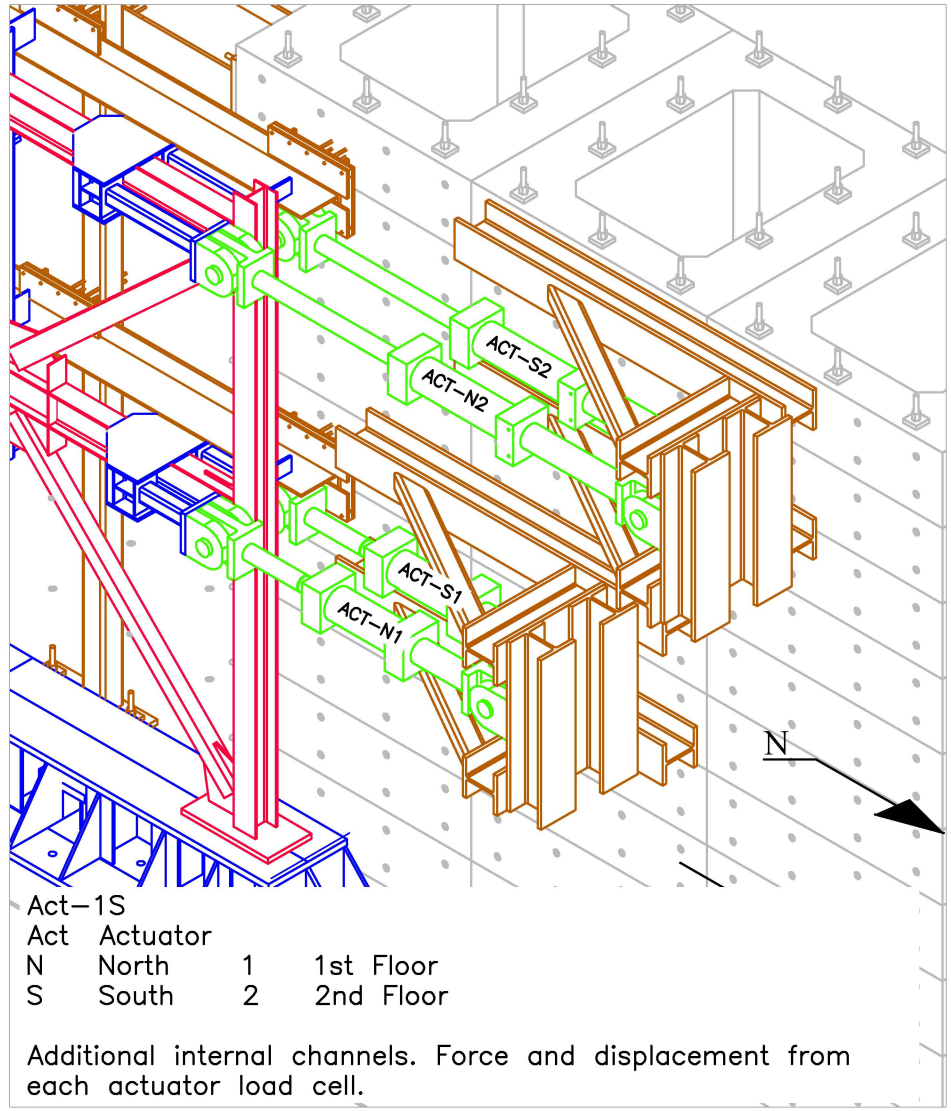
Date
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Sensor Title
NCBF–B–3SB

Sheet
S0



SLIP–B
SLIP Slip Monitoring
B Beam
RW Reaction Wall N North
S South



Act–1S
Act Actuator
N North 1 1st Floor
S South 2 2nd Floor

Additional internal channels. Force and displacement from each actuator load cell.

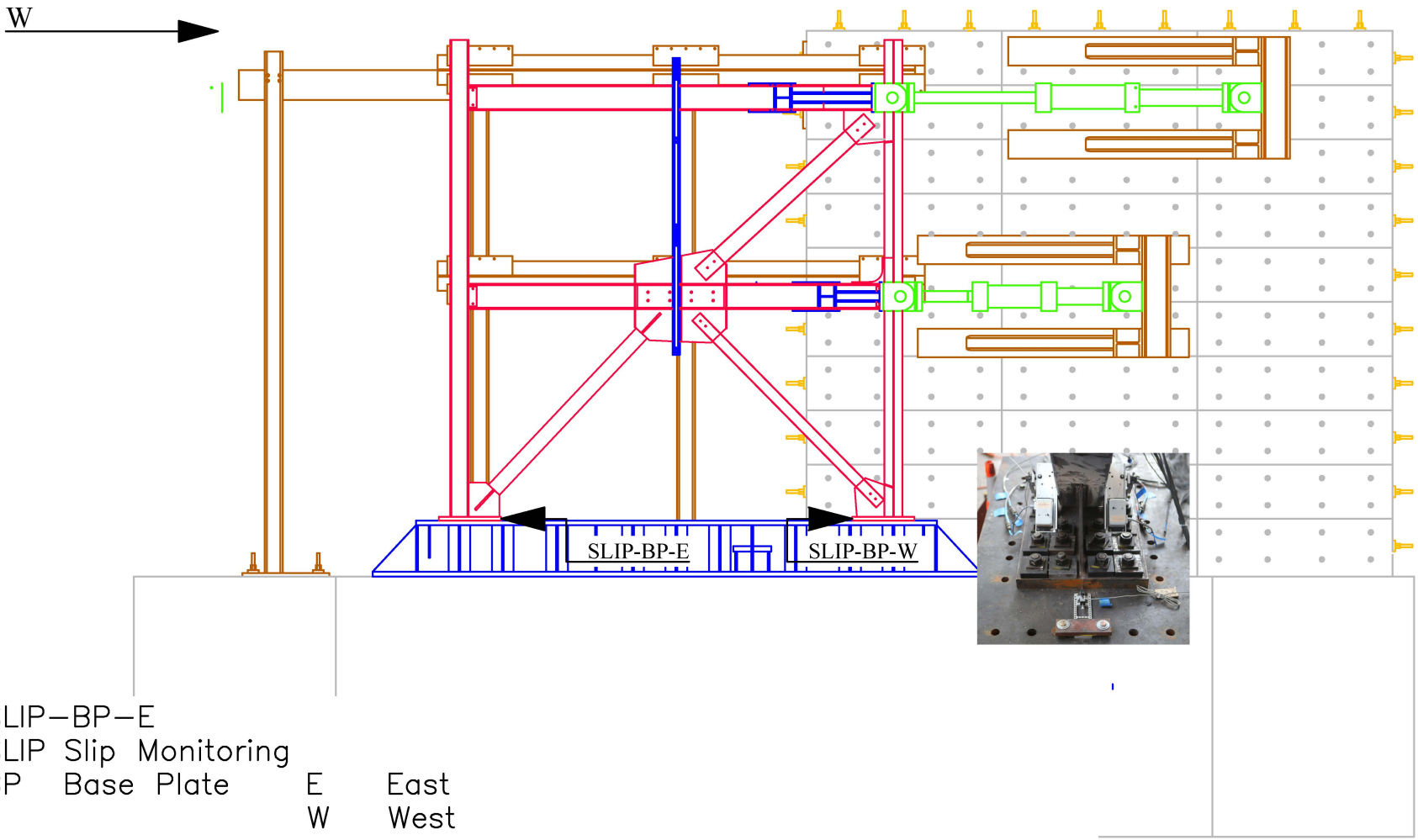
Project
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8/6/2014

Sensor Title
Test Monitoring

Sheet
S1



SLIP–BP–E
SLIP Slip Monitoring
BP Base Plate E East
W West

Align with braced frame centerplane at middle of base plate.

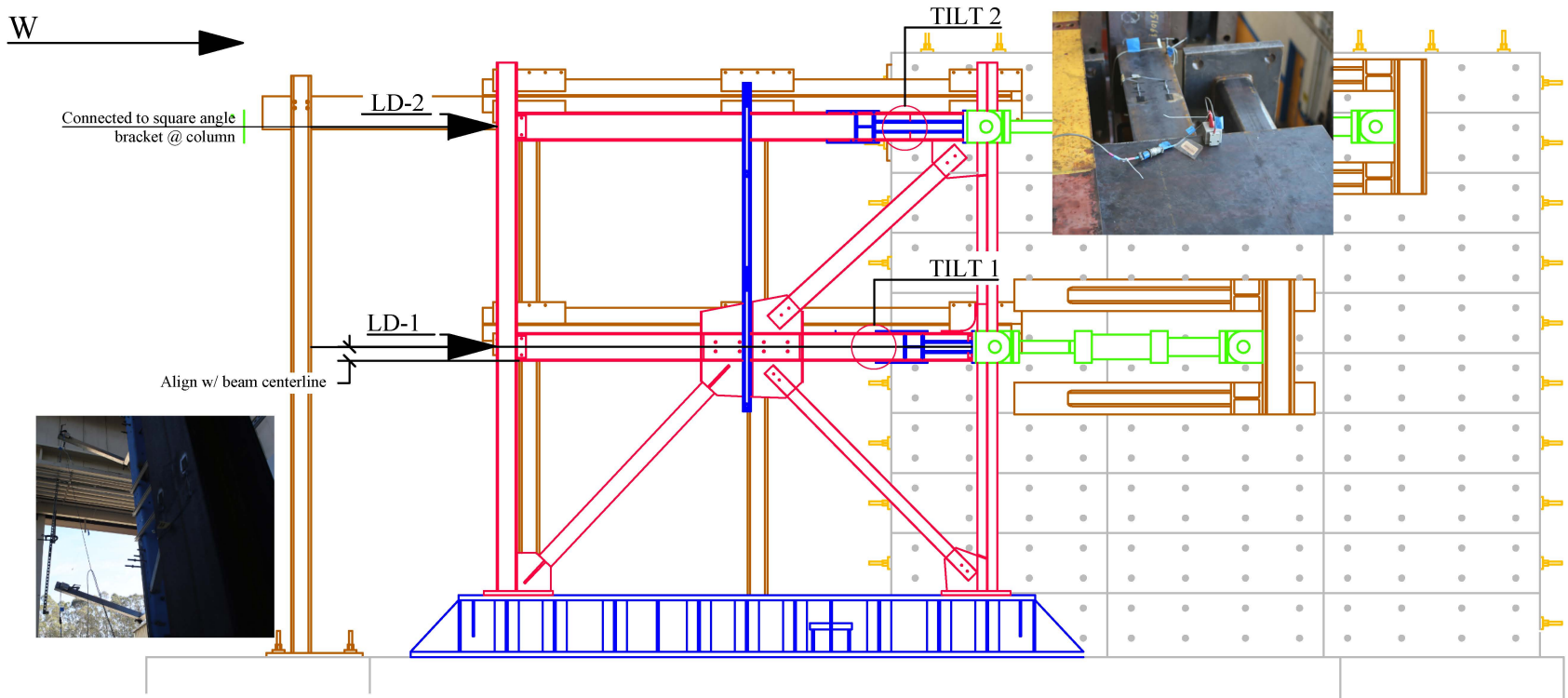
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8/6/2014

Sensor Title
Slip LVDT

Sheet
S2



LD-1
LD Lateral Displacement Monitoring
1 1st Floor
2 2nd Floor

Align with beam centerline at each floor. Connect to supporting frame column by elbowed HSS Aluminum pieces.

TILT1
TILT Accelerometer monitoring angle of actuator brackets.
1 1st Floor
2 2nd Floor

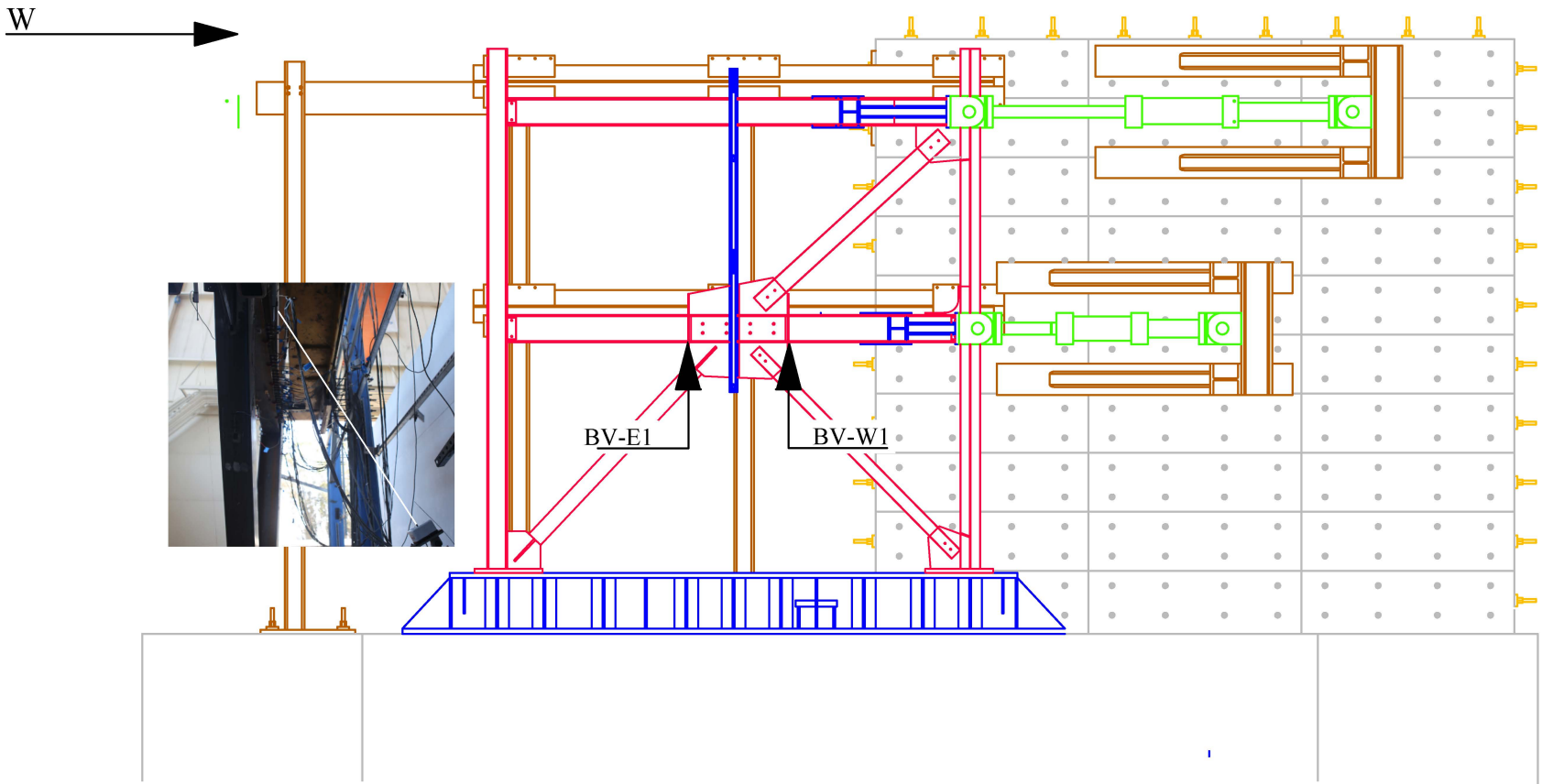
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8/6/2014

Sensor Title
Story Displacement

Sheet
S3



BV-E1
BV Beam Vertical Displacement
E East 1 1st Floor
W West 2 2nd Floor

Align with beam bottom flange and gusset edge.
(2) on either side of beam frame.

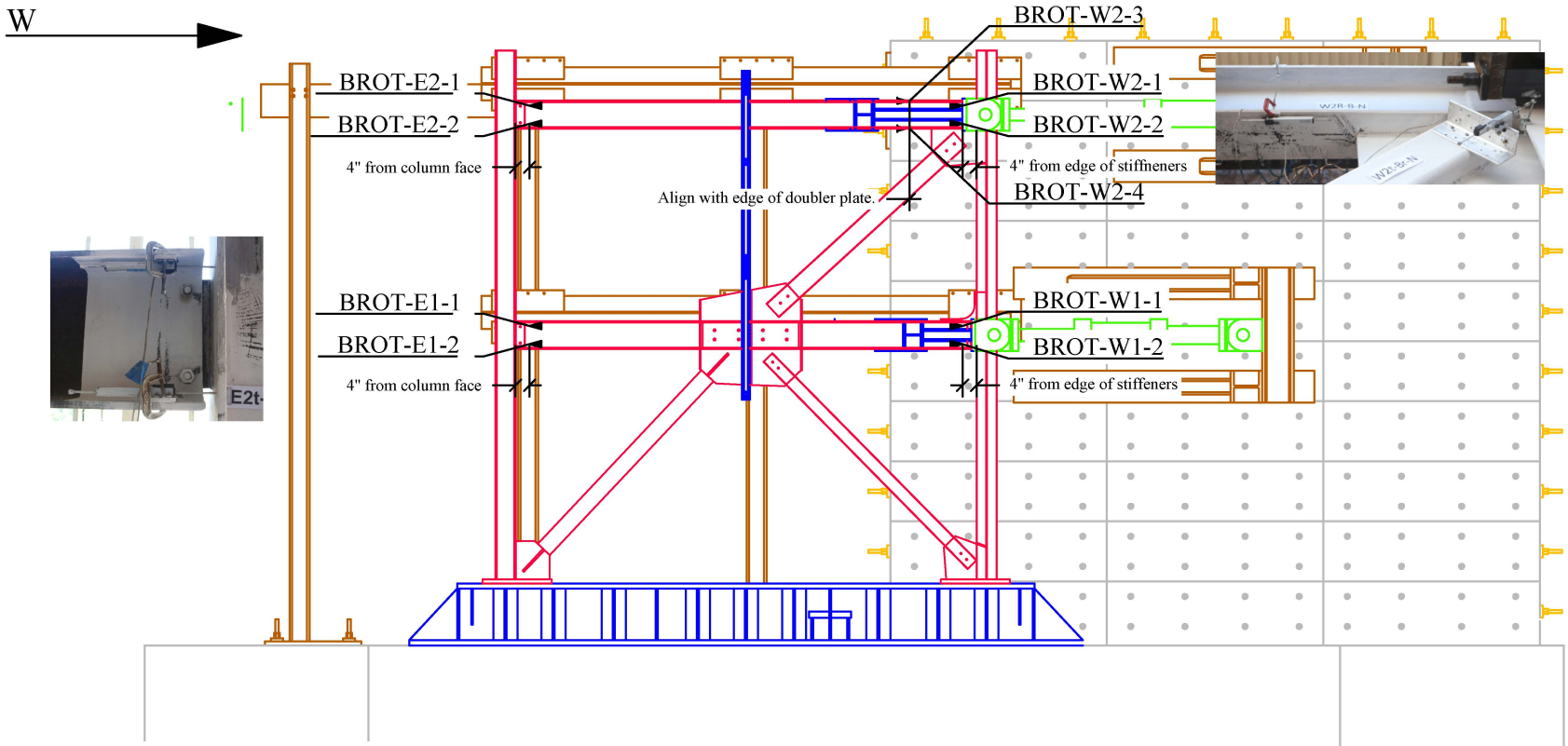
Project
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Sensor Title
Beam Vertical WirePot

Sheet
S4



BROT-E1-1
BROT Beam Rotation Monitoring
E East 1 1st Floor
W West 2 2nd Floor
1,2 Outer Location, see drawing (1-top, 2-bottom)
3,4 Inner Location, see drawing (3-top, 4-bottom)

Target at column face (at stiffener for weak-axis column and flange for strong-axis column) at each floor.

Project

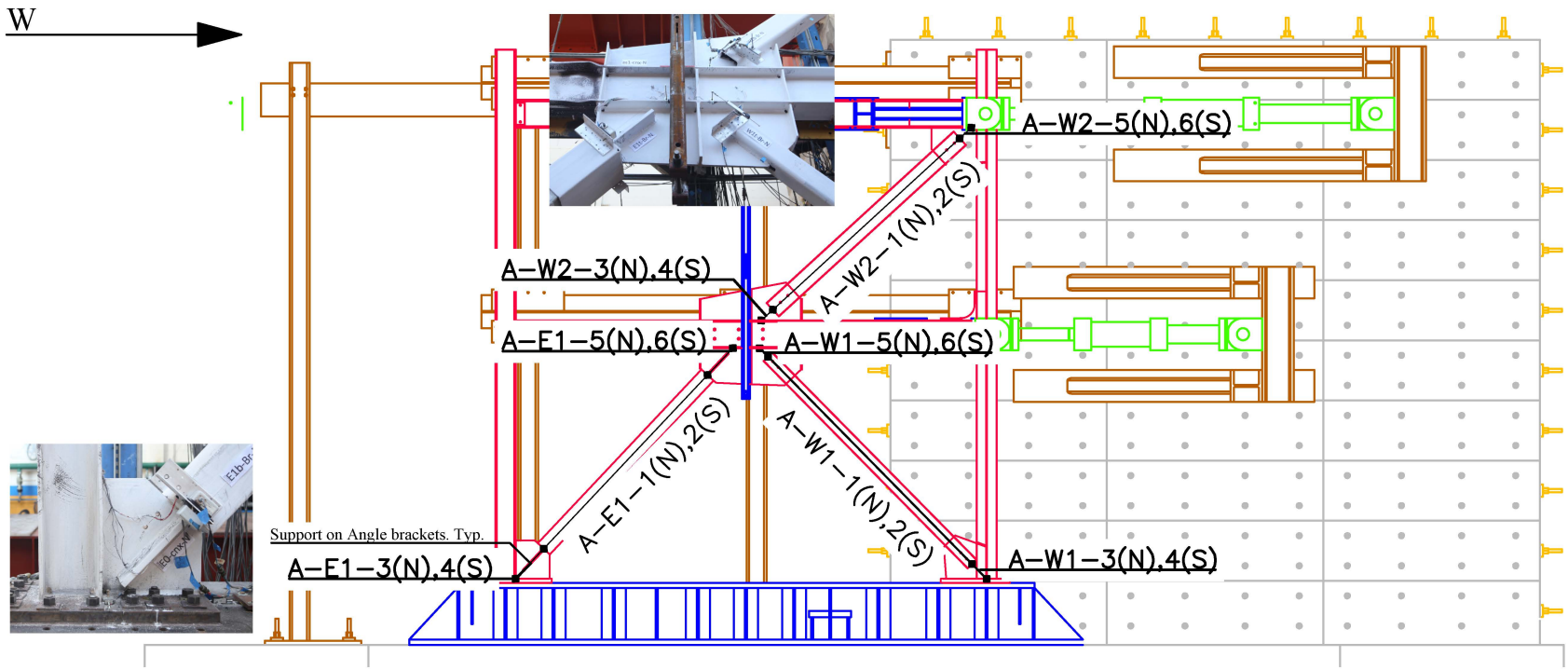
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Sensor Title
Beam Rotation LVDT

Sheet
S5



A–E1–1
A Axial Deformation of Brace
E East 1 1st Floor
W West 2 2nd Floor
(N) North–Facing Front View
(S) South–Facing Back View
1,2 Wire pot from brace end-to-end
3,4,5,6 LVDT, see drawing for location (3,4-lower, 5,6-upper)

Brace axial deformation monitoring along the axis of brace. Support on brackets 4" or 5" from face of brace on both sides of brace. LVDT at ends of brace to monitor brace out–of–plane rotation. Wire pot to measure brace elongation.
NOTE: A–E1–3,4,5,6 are wirepots.

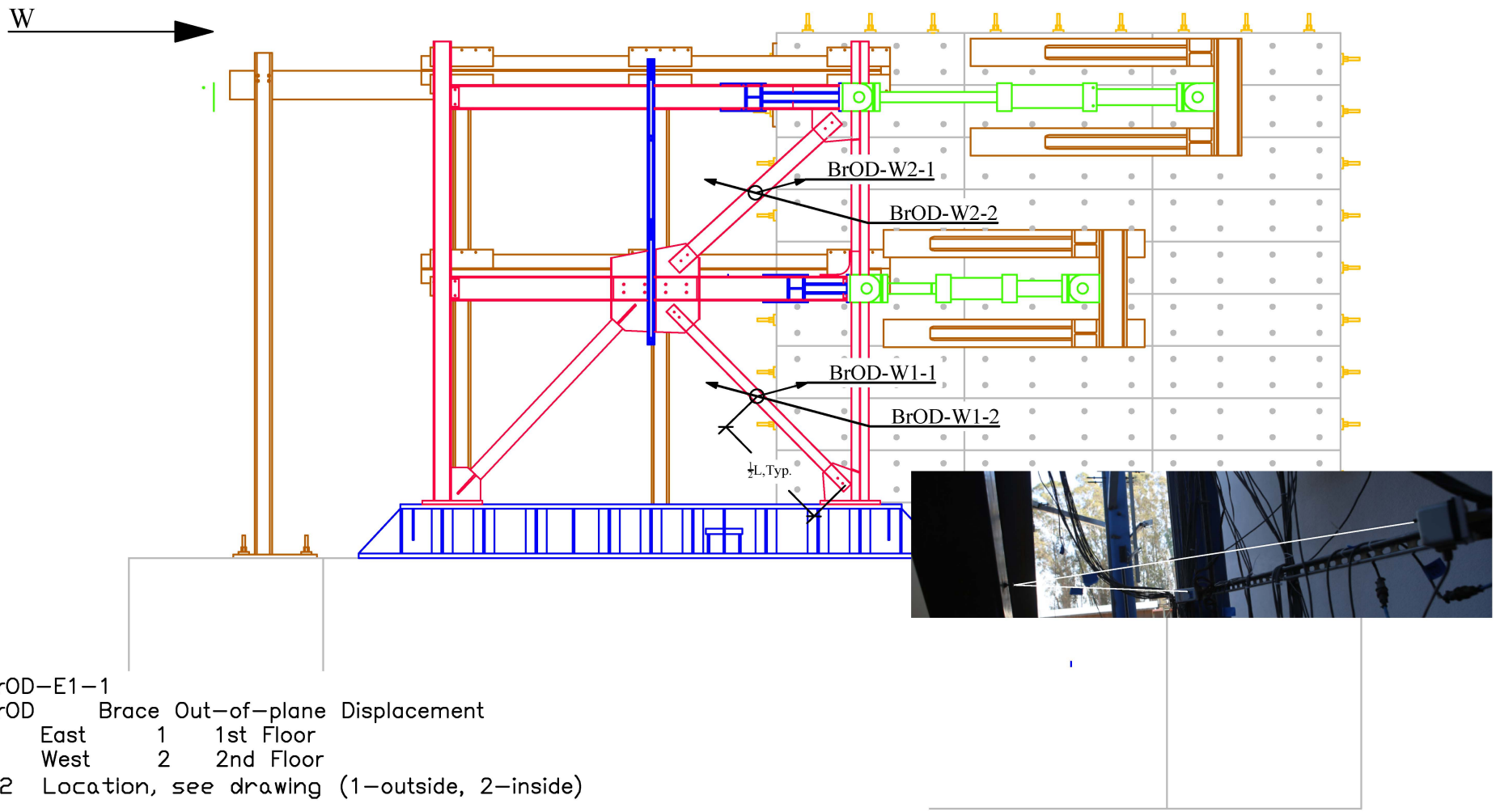
Project
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8/6/2014

Sensor Title
Brace Axial

Sheet
S6



BrOD–E1–1
BrOD Brace Out–of–plane Displacement
E East 1 1st Floor
W West 2 2nd Floor
1,2 Location, see drawing (1–outside, 2–inside)

(2) Wire Pots per Brace. Align at Brace Centerline. Connect to supporting frame. Target welded at brace midpoint.

Project

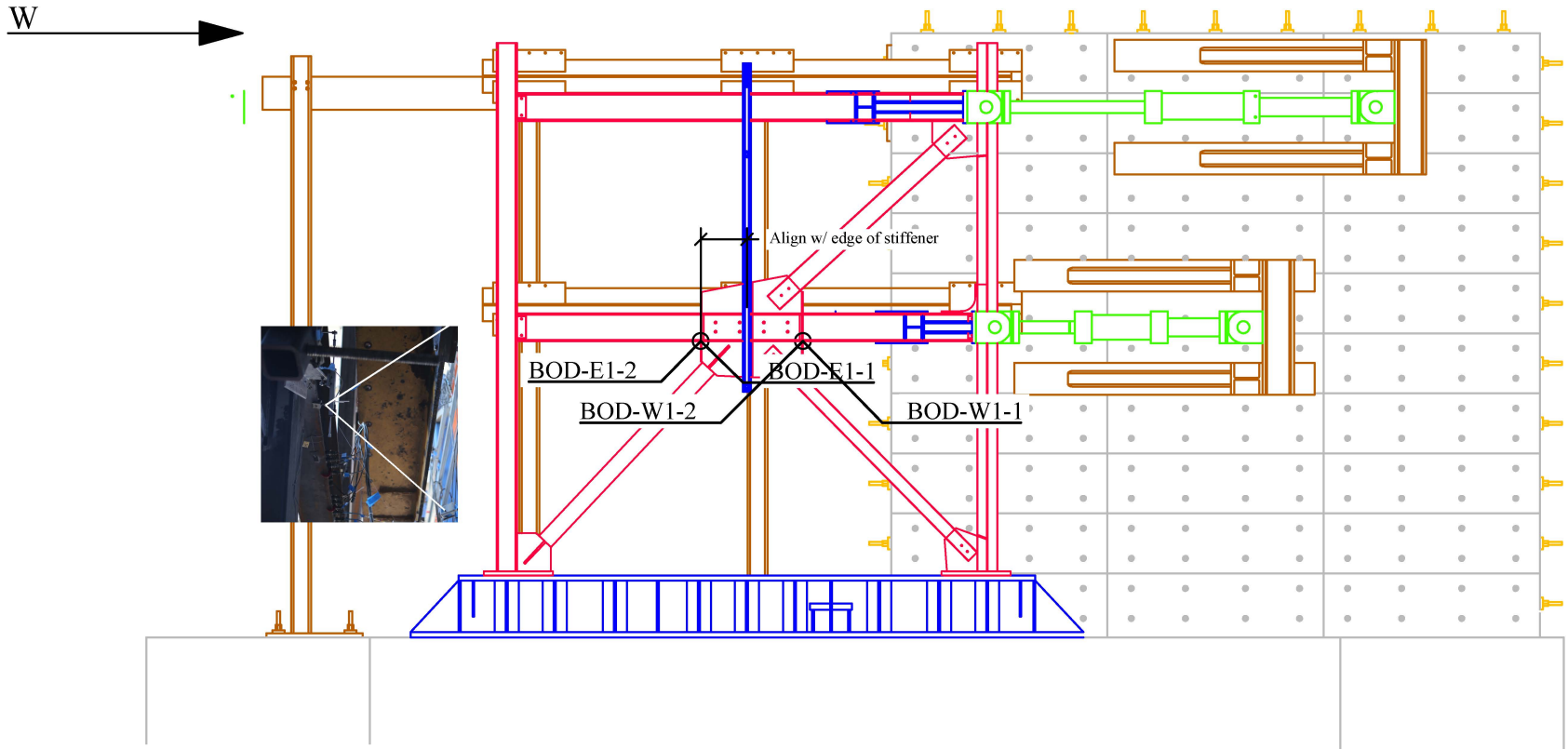
Collaborative Developments for Seismic Rehabilitation of Vulnerable Braced Frames

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Sensor Title
Brace Out–of–Plane

Sheet
S7



BOD–E1–1
BOD Beam Out–of–plane displacement
E East 1 1st Floor
W West 2 2nd Floor
1,2 Location, see drawing (1–top, 2–bottom)

Align with Edge of Gusset. Target at beam flange.

Project

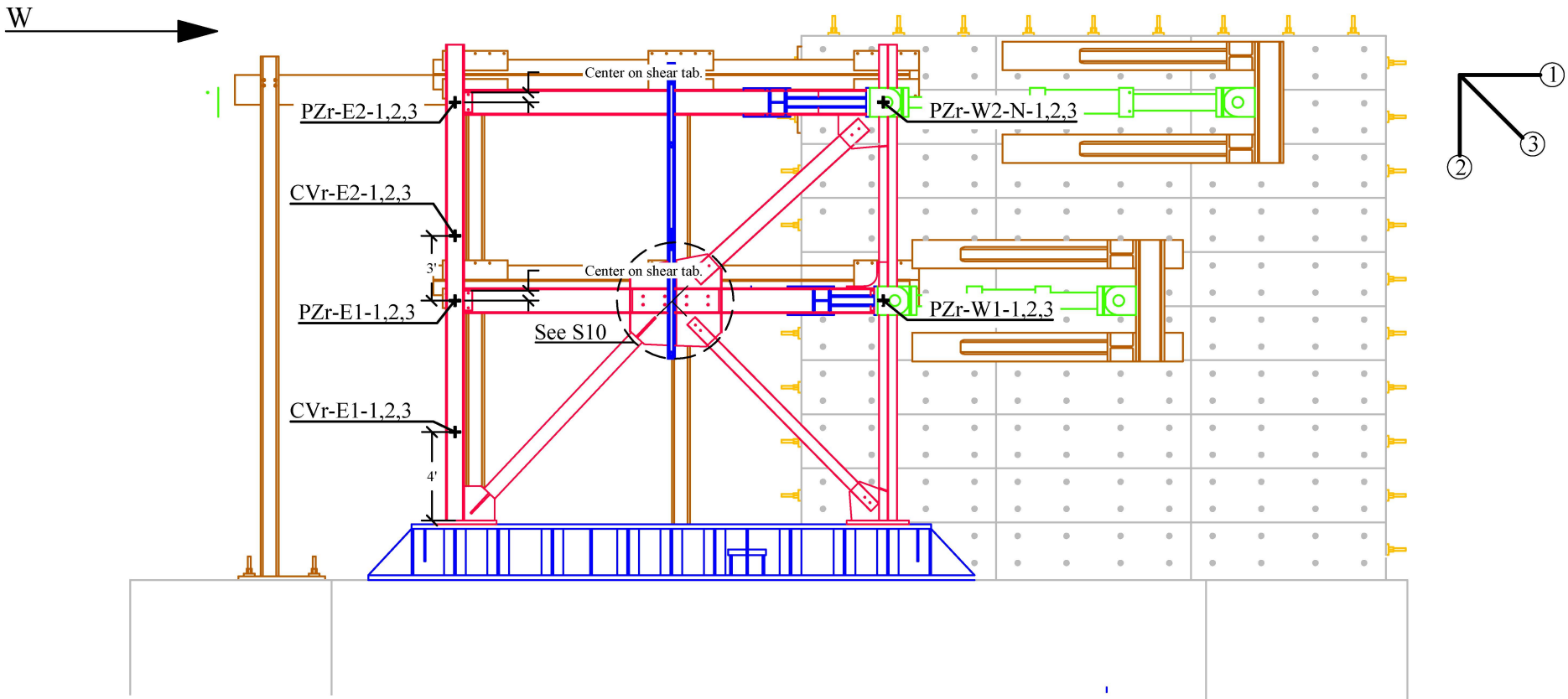
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Sensor Title
Beam Monitoring

Sheet
S8



PZr-E1-1,2,3
CVr-E1-1,2,3
PZr Panel Zone rosette
CV4 Column Shear rosette
E East 1 1st Floor N North Shear Tab
W West 2 2nd Floor S South Dual Shear Tab Douber Plate
1,2,3 1-0deg. 2-90deg. 3-135deg.

Project

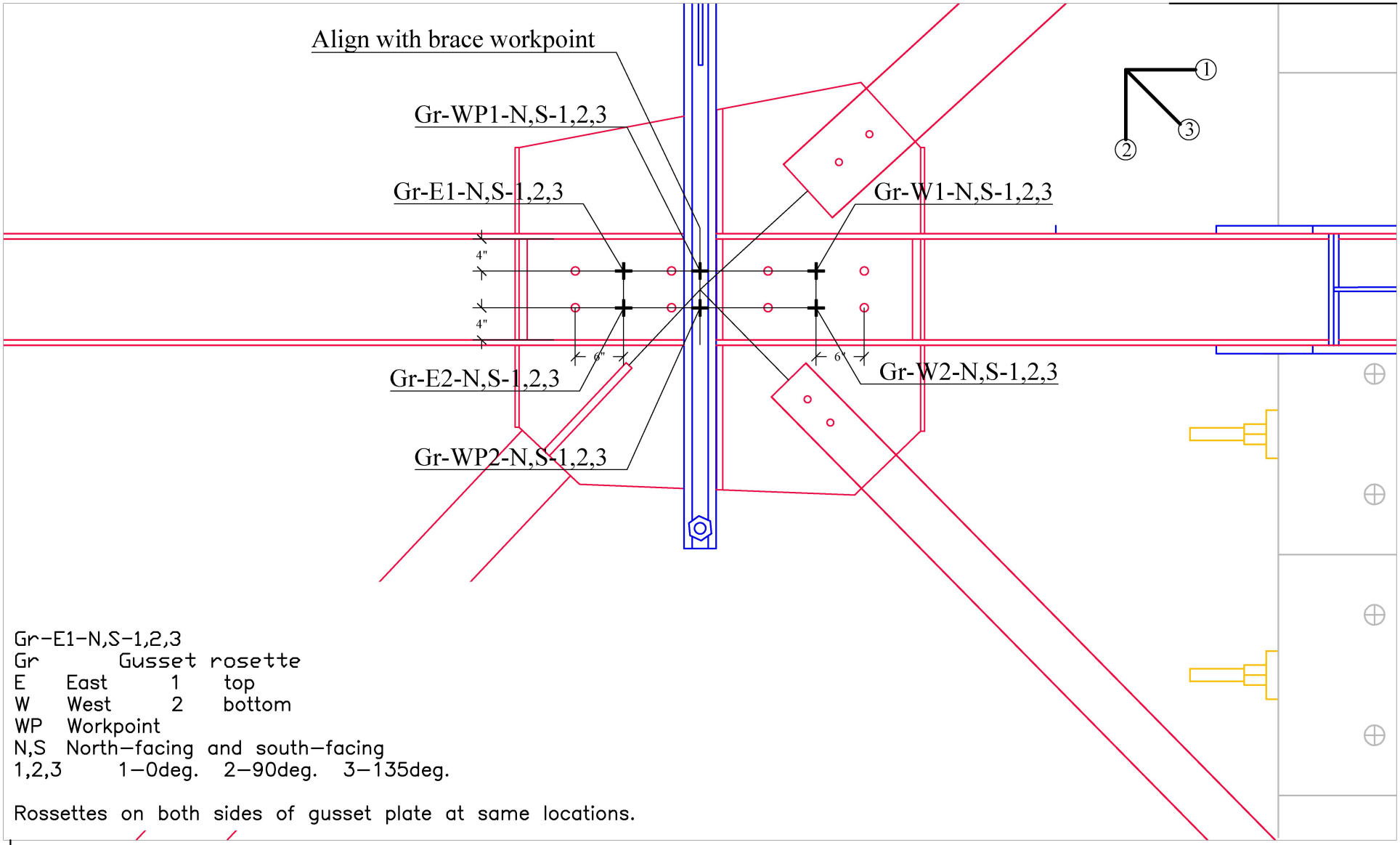
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Sensor Title
Column Rosettes

Sheet
S9



Gr-E1-N,S-1,2,3

Gr	Gusset rosette		
E	East	1	top
W	West	2	bottom
WP	Workpoint		
N,S	North-facing and south-facing		
1,2,3	1-0deg.	2-90deg.	3-135deg.

Rossettes on both sides of gusset plate at same locations.

Project

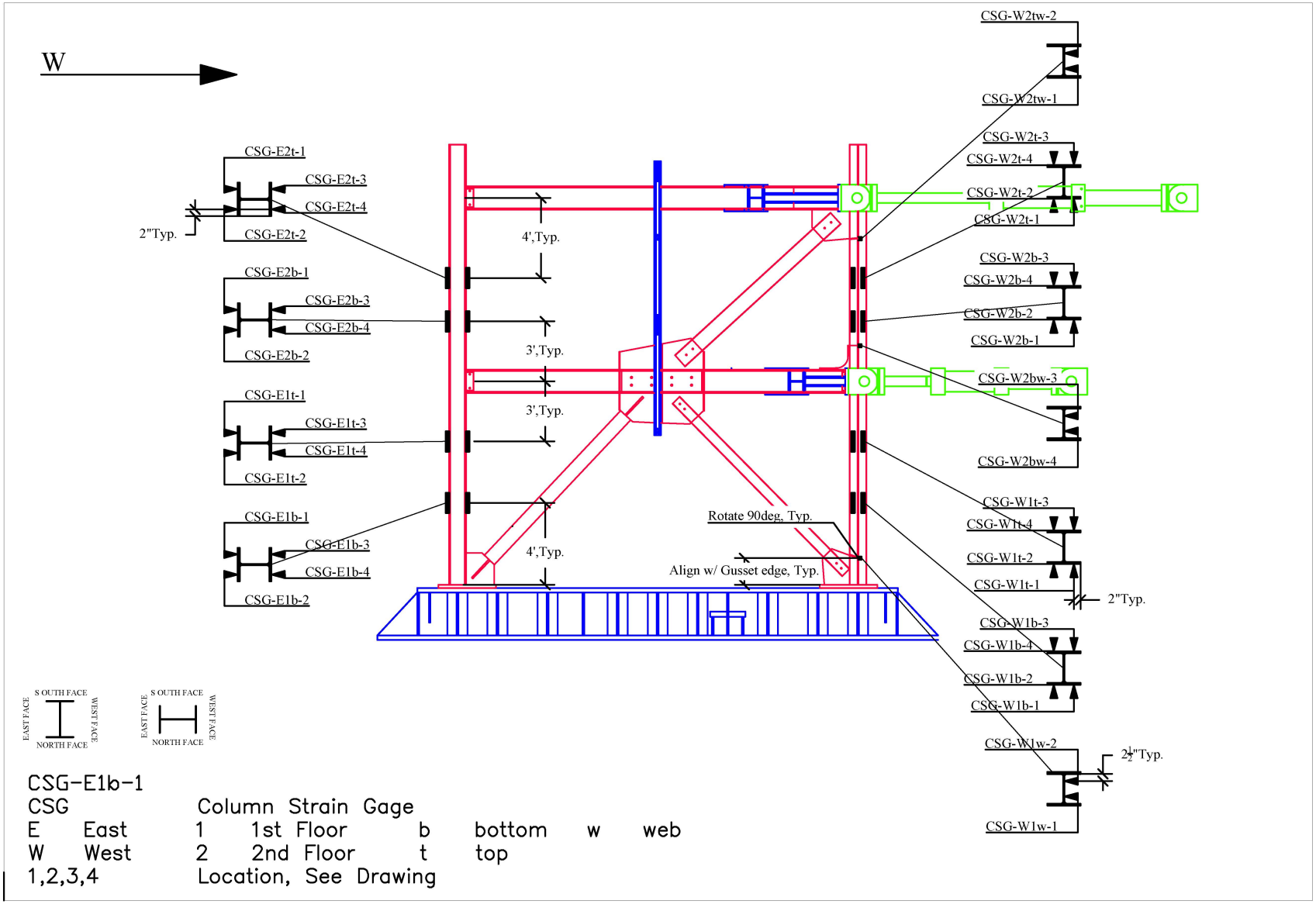
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Sensor Title
Gusset Rosettes

Sheet
S10



CSG-E1b-1

CSG		Column Strain Gage					
E	East	1	1st Floor	b	bottom	w	web
W	West	2	2nd Floor	t	top		
1,2,3,4		Location, See Drawing					

Project

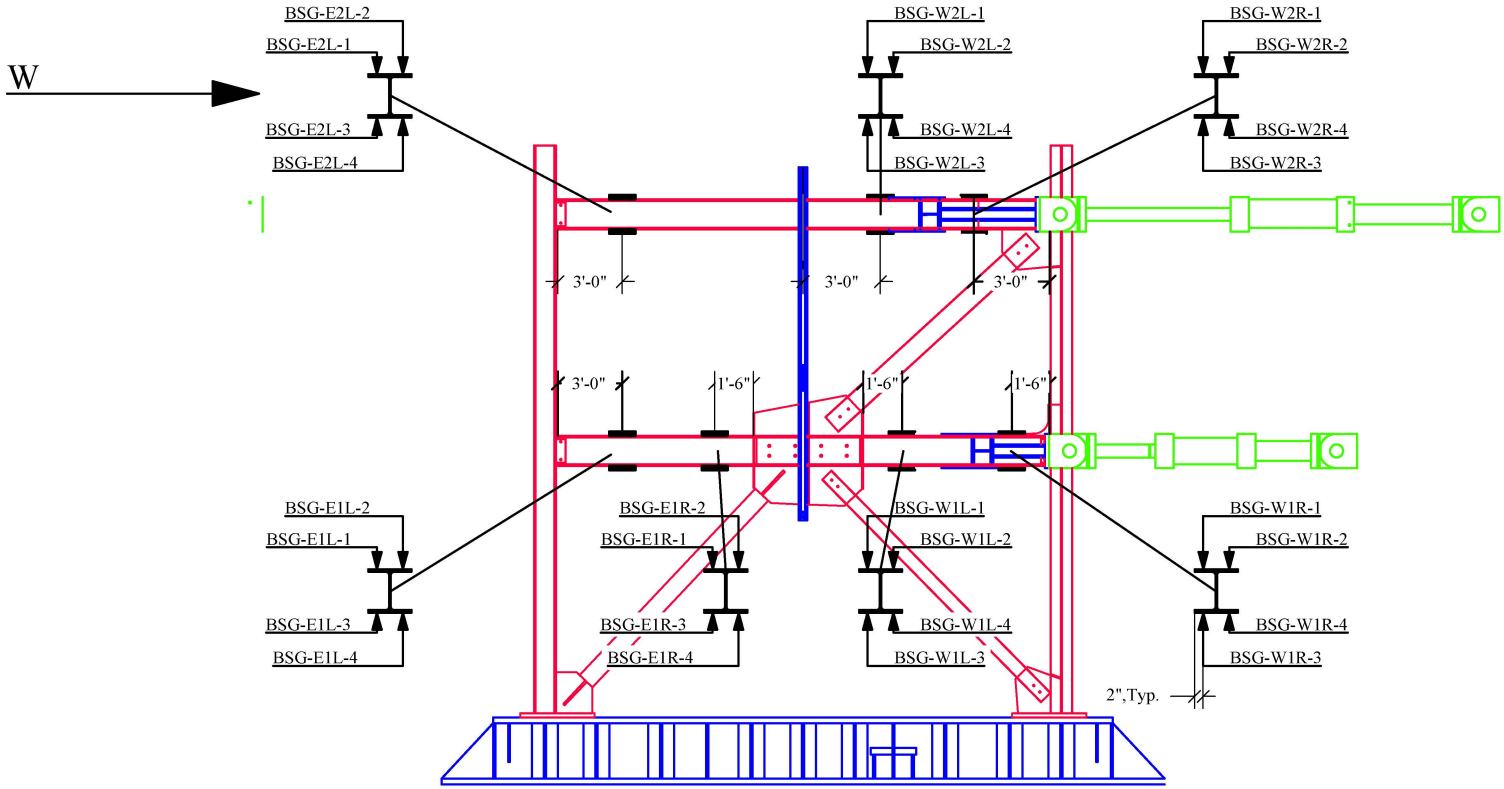
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Sensor Title
Column Strain Gage

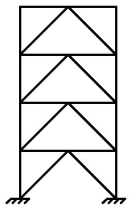
Sheet
S 1 1





BSG-E1L-1

BSG	Beam Strain Gage				
E	East	1	1st Floor	L	left
W	West	2	2nd Floor	R	right
1,2,3,4	Location, See Drawing				



Project

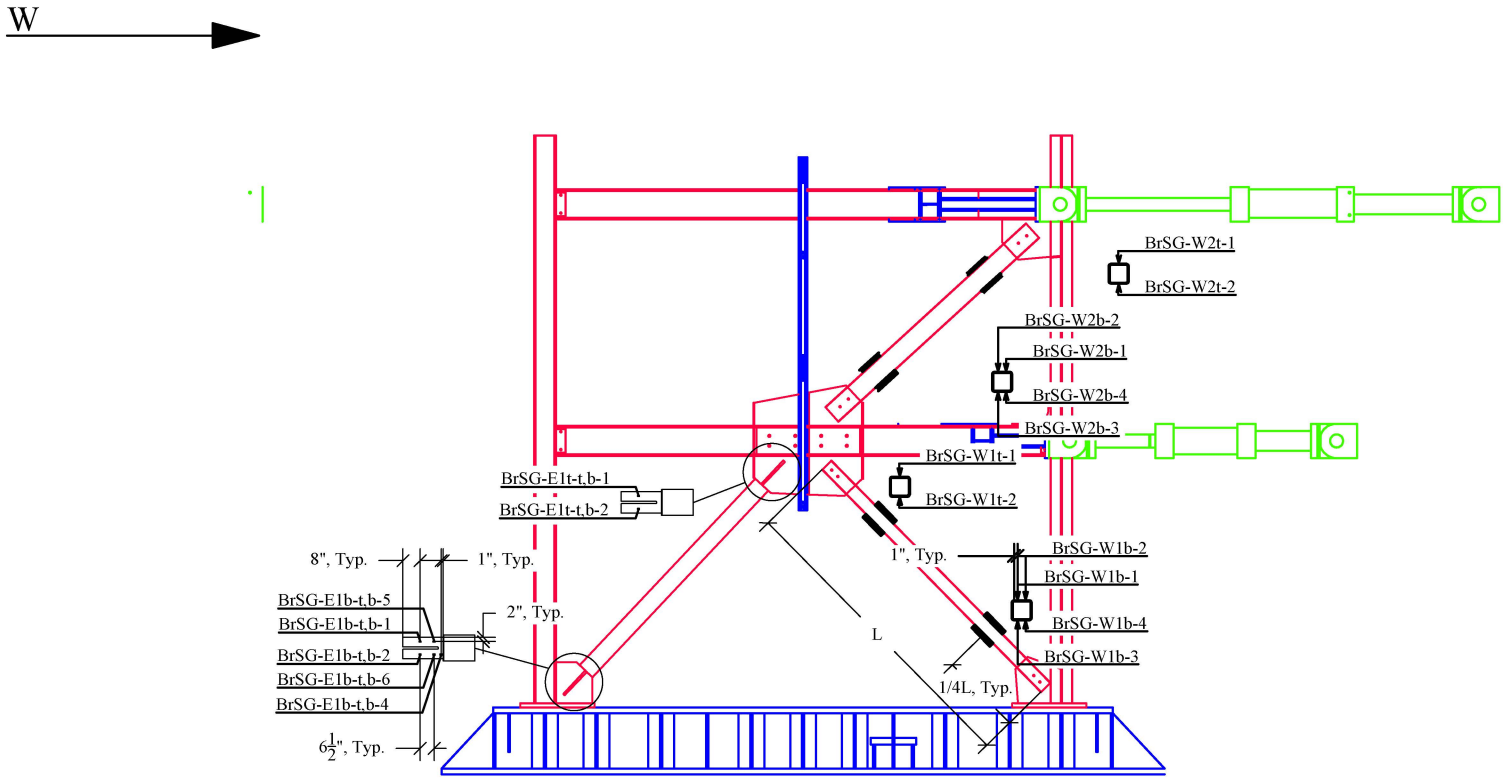
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Sensor Title
Beam Strain Gage

Sheet
S 1 2



BrSG-E1b-1

BrSG	Brace Strain Gage				
E	East	1	1st Floor	b	bottom
W	West	2	2nd Floor	t	top
N	North-facing				
S	South-facing				
1,2,3,4	Location, See Drawing				

Project

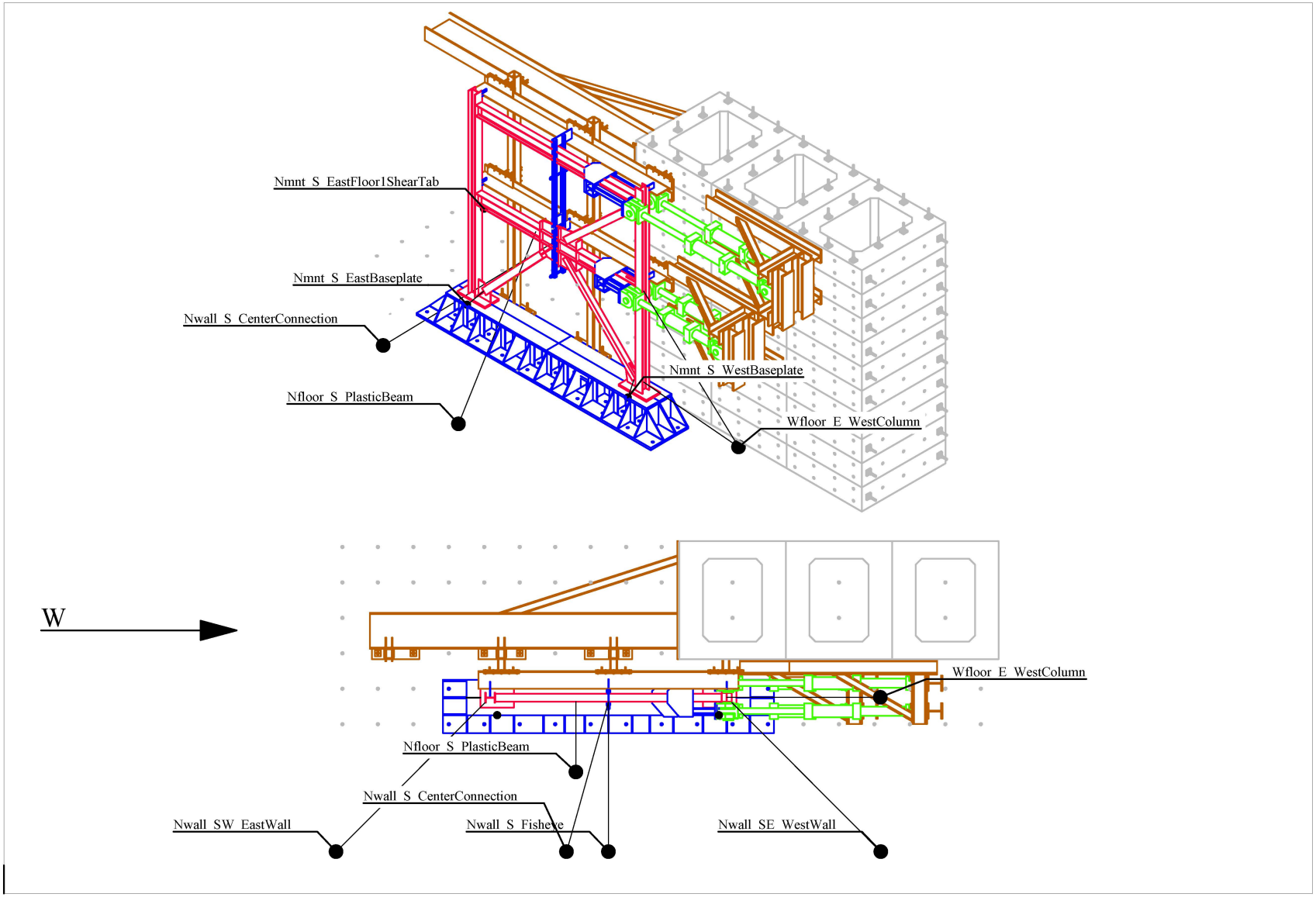
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Sensor Title
Brace Strain Gage

Sheet
S 1 3



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Sensor Title
Cameras

Sheet
S14